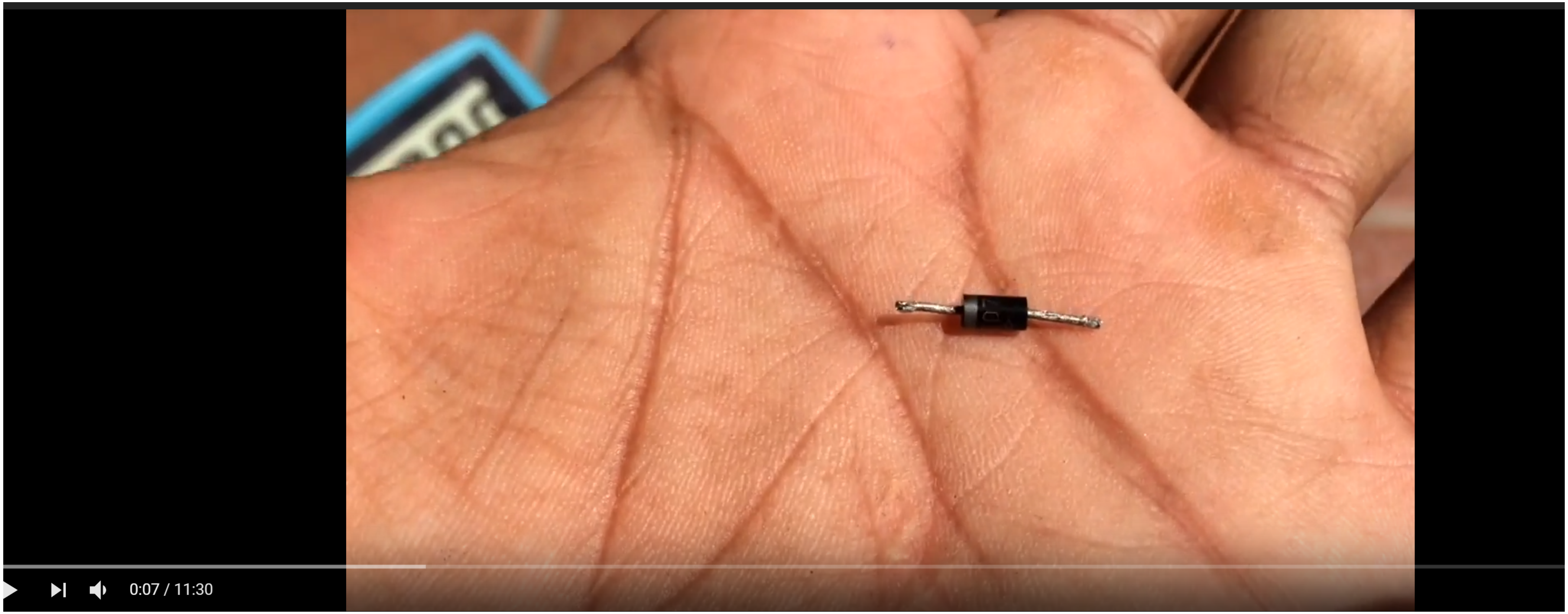
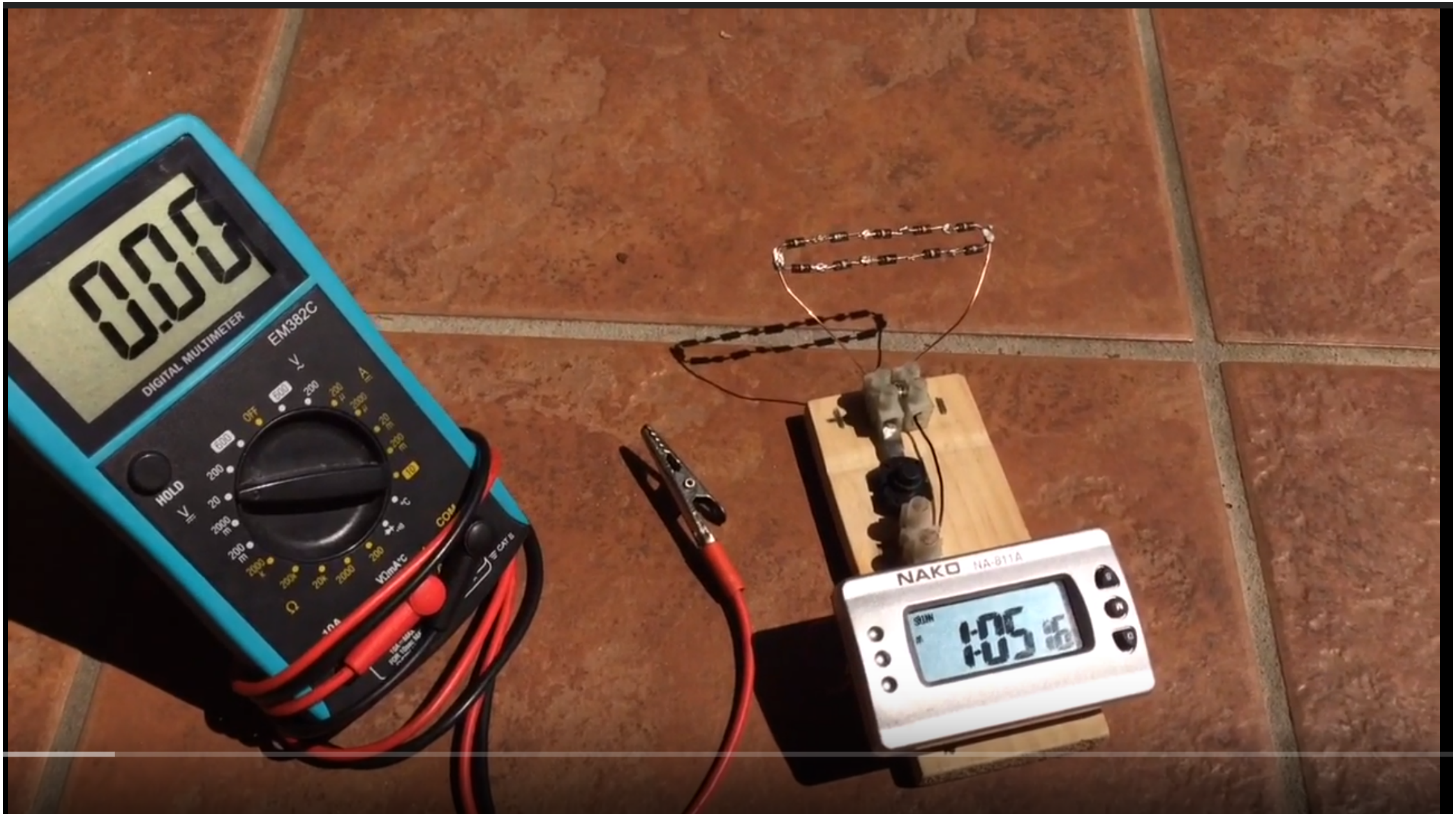

inspired by
Making a Transistor Radio
Ladybird Books
1972



Extraer energia solar con diodos 1n4007 diodos reciclados

Up next



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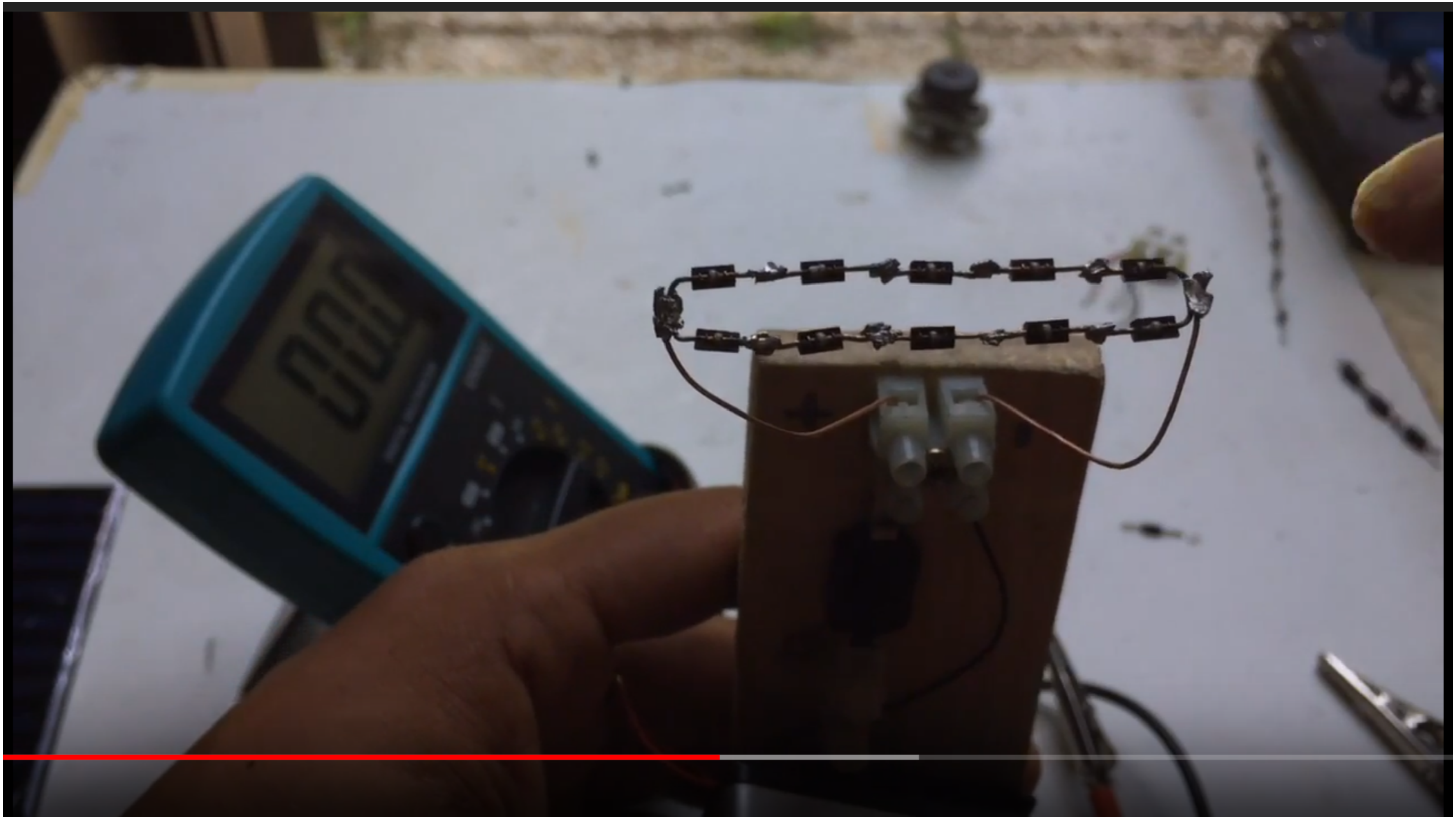
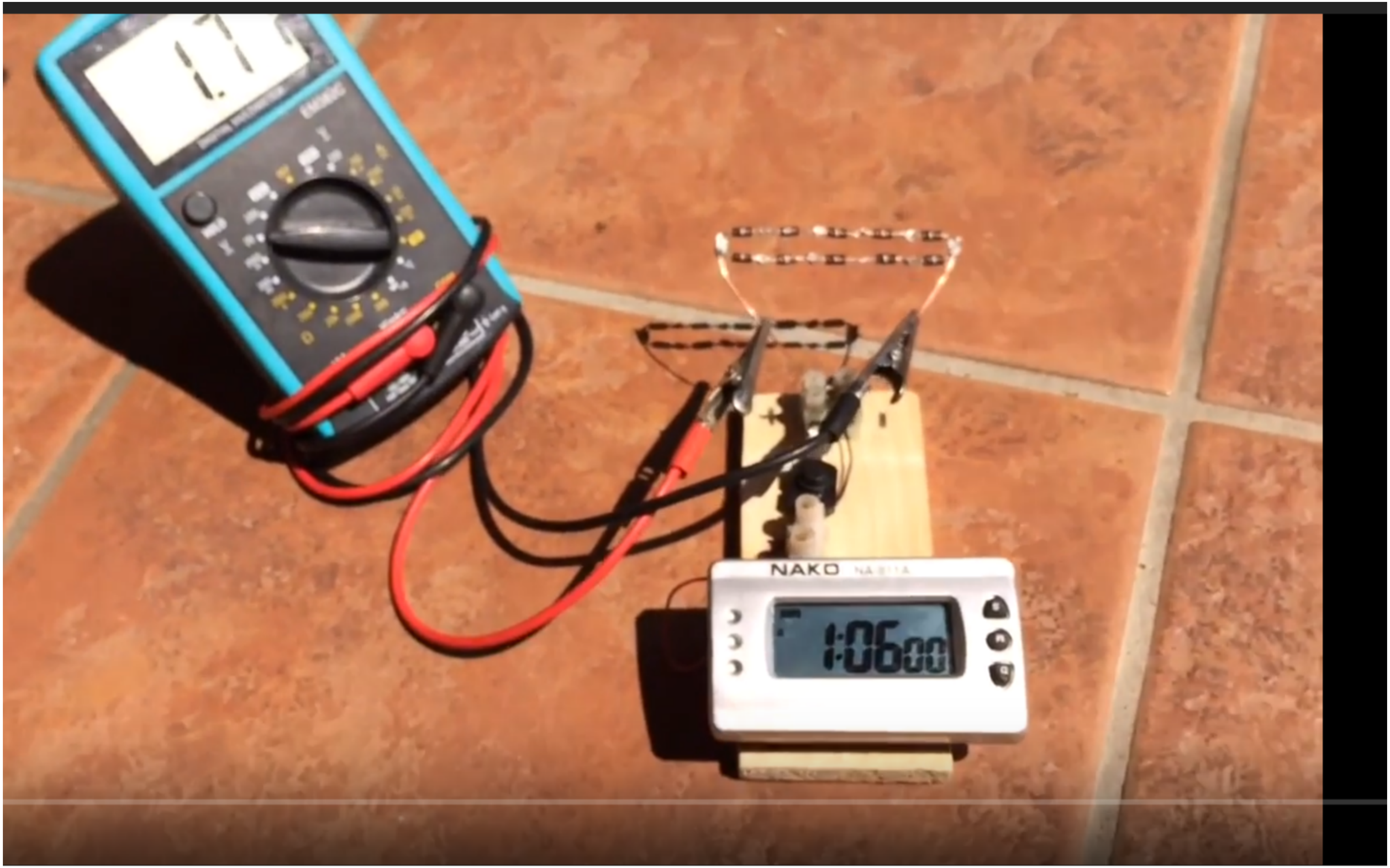
NA-811A




NAKO
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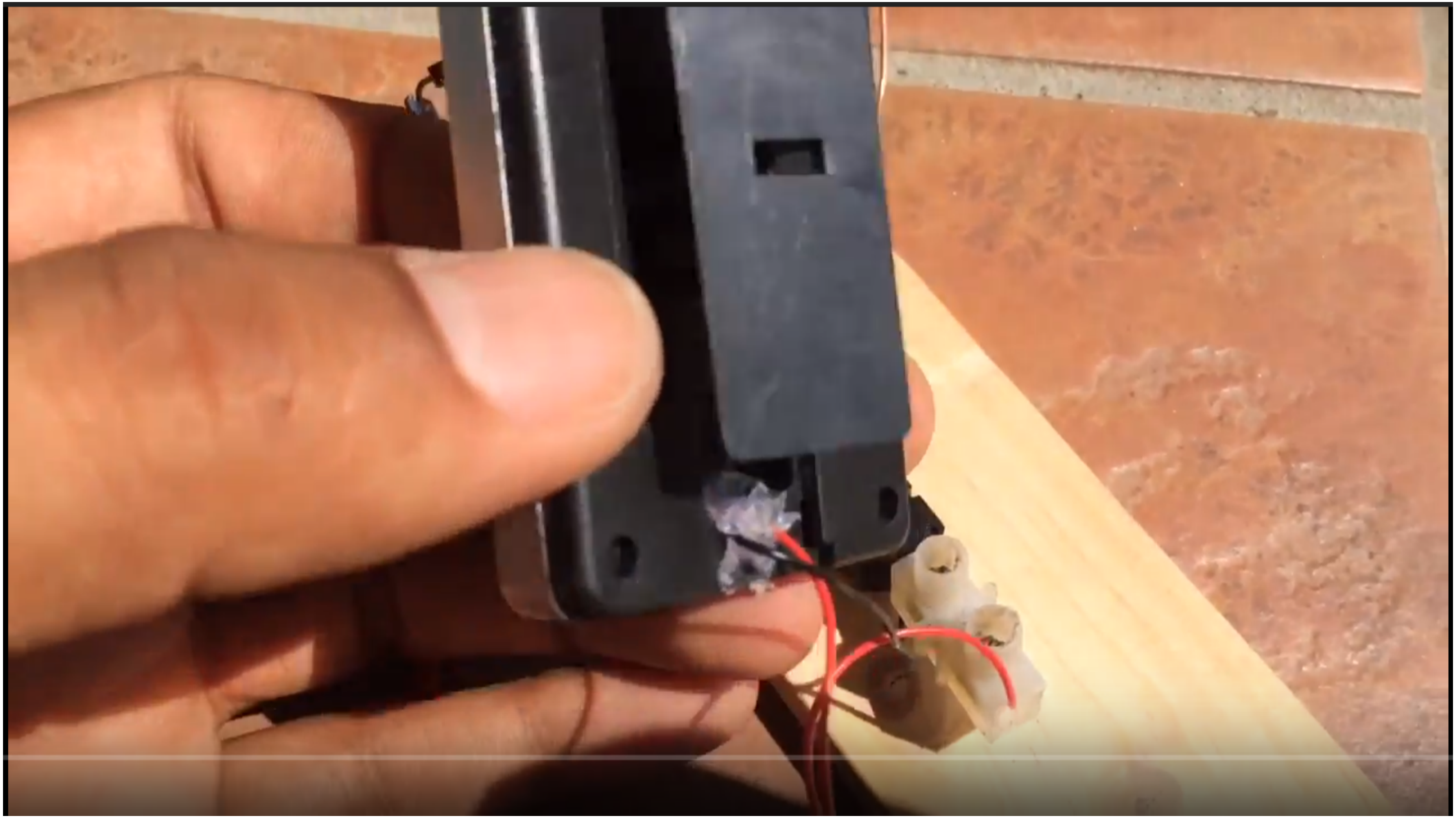

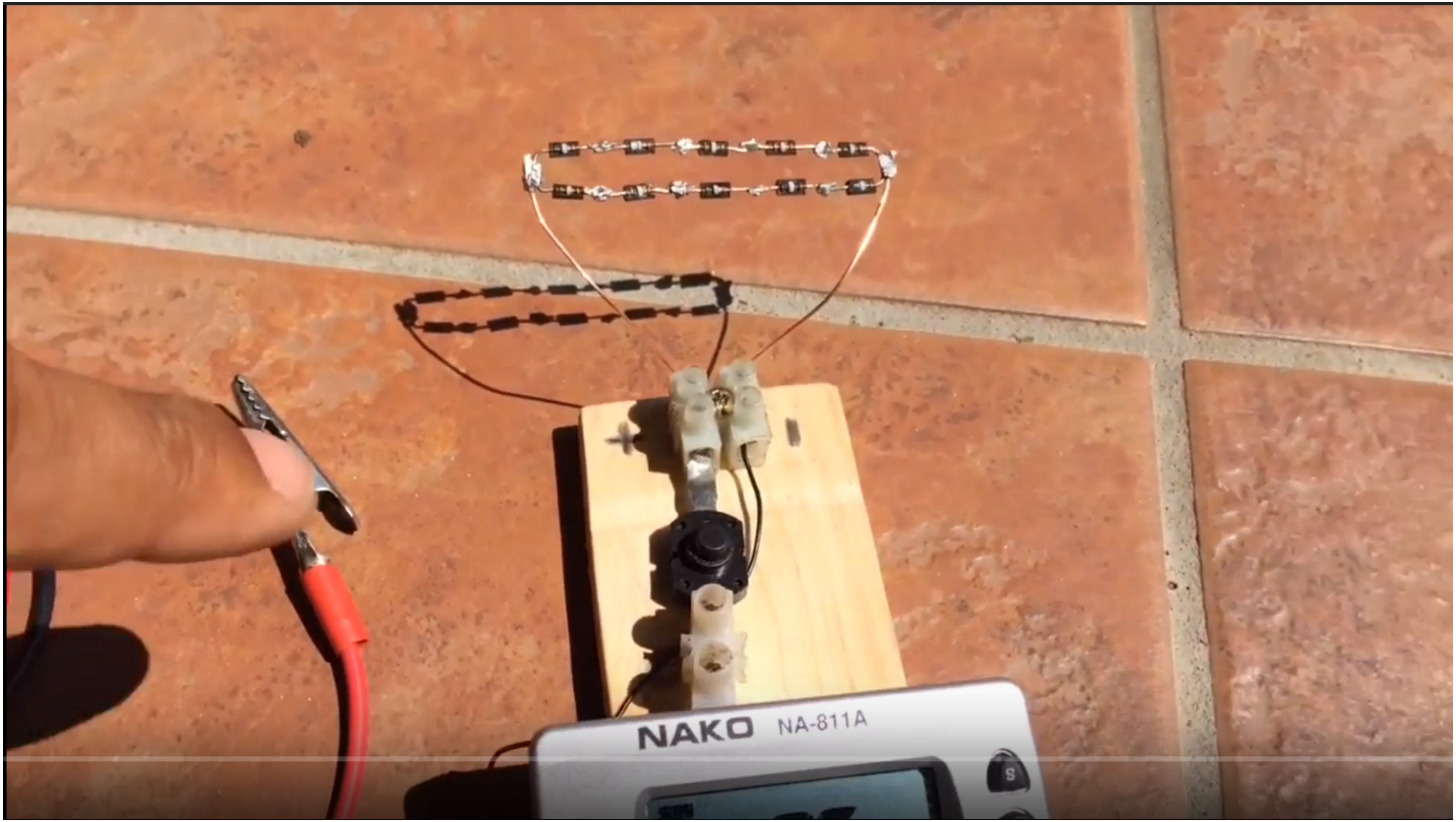
NAKO NA-811A
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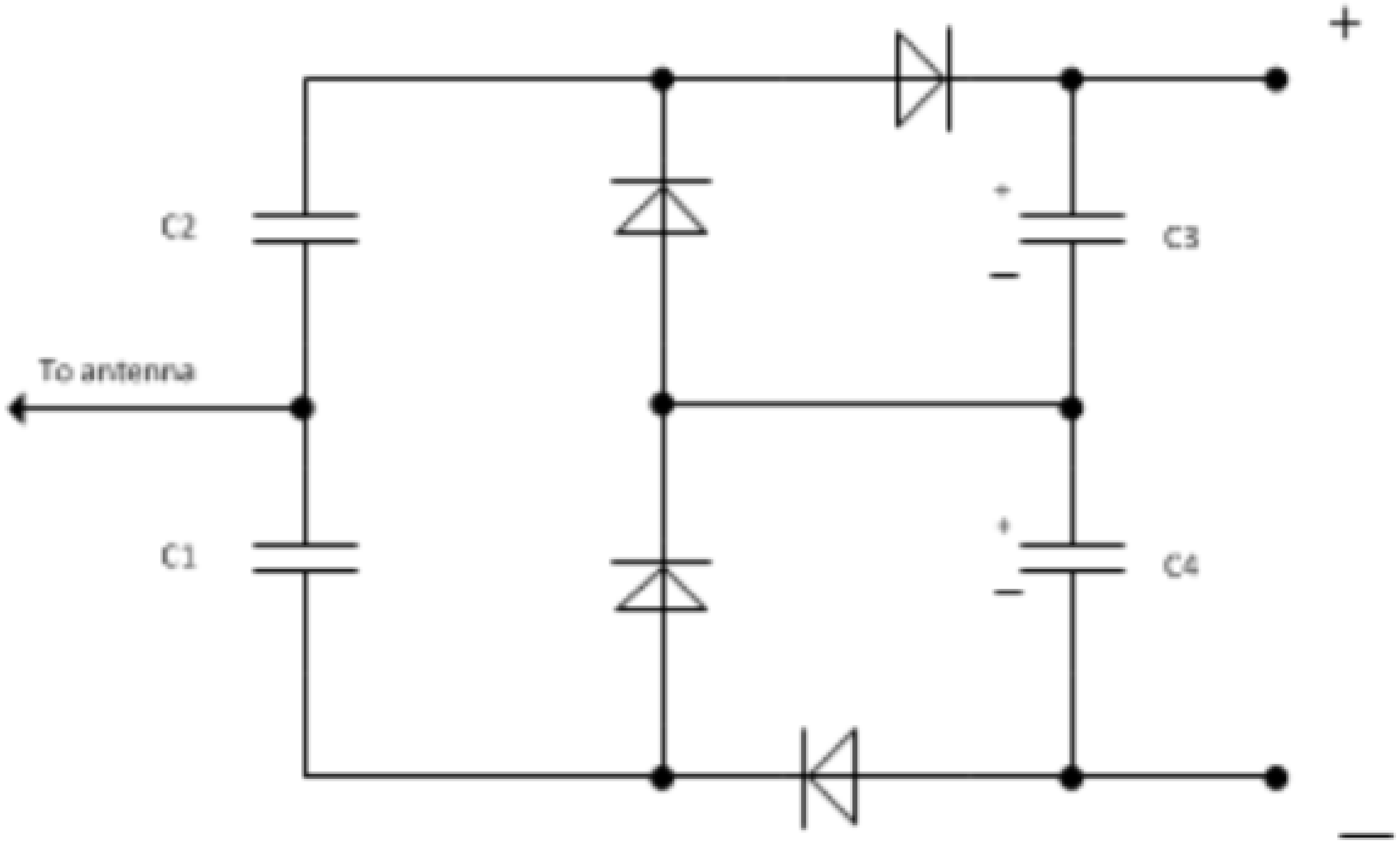
- (4) 1N34 germanium diodes
- (2) 100 µF 50 V electrolytic capacitors
- 0.2 µF 50 V ceramic capacitors

Here is the electrical diagram they provide:



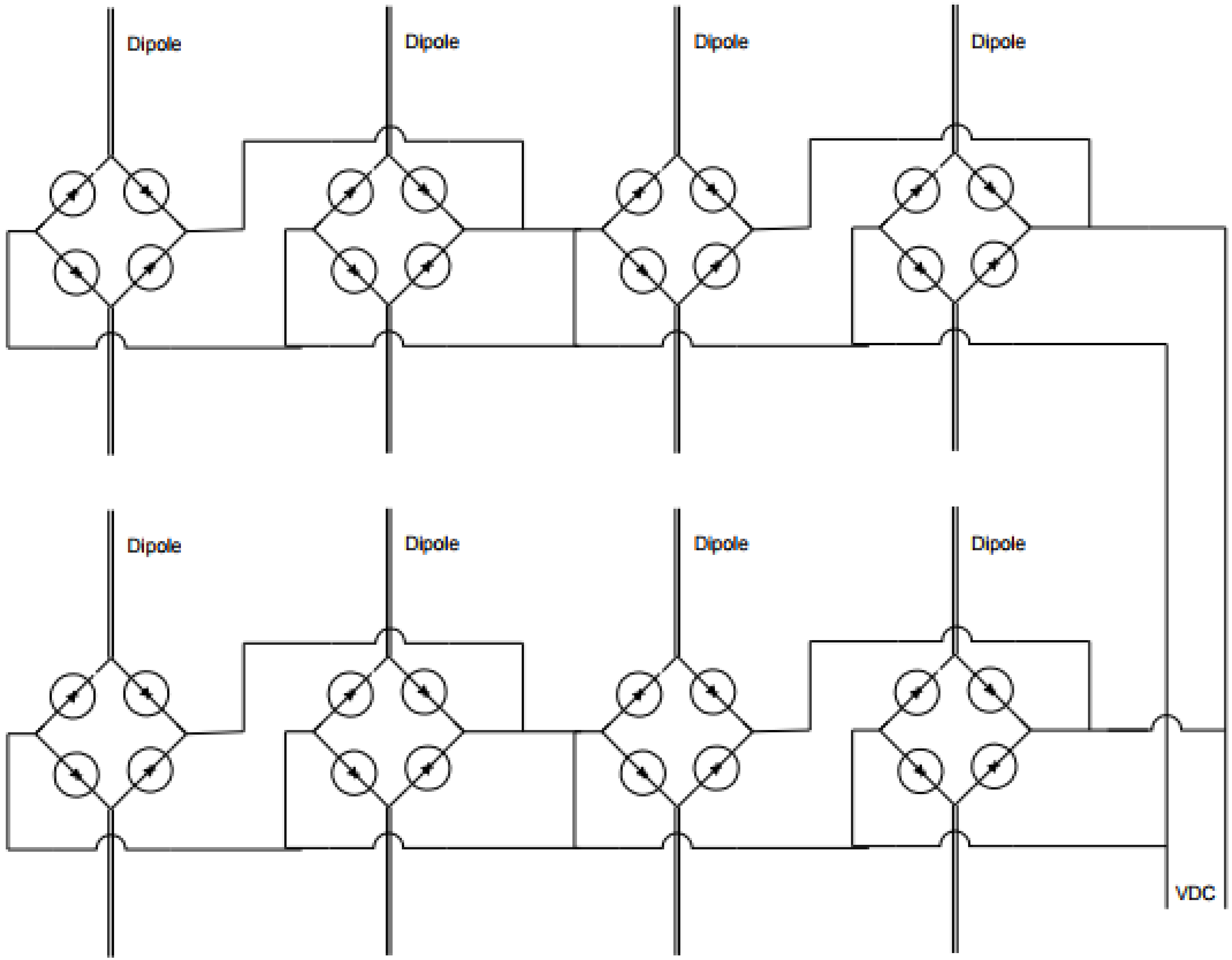


Figure 4. Rectenna Array [Brown, W.C., Patent 3,434,678, 1984, page 1]

sign in this paper uses a capacitor across the load to store and provide DC leveling of the output voltage and its value only affects the speed of the transient response. Without a capacitor across the load, the output is not a good DC signal, but more of an offset AC signal.

In addition to the above, an equivalent load resistor is connected at the final node. The output voltage across the load decreases during the negative half cycle of the AC input signal. The voltage decreases is inversely proportional to the product of resistance and capacitance across the first stage was 3.3 nF, the second stage was 1.65 nF, third stage was 825 pF, fourth stage was 415 pF and so on. But keeping in view of testing, the capacitance values were chosen to have a close match with the standard available values in the market.

Simulation was carried out through 4 to 9 voltage doubler stages. Based on results obtained a 7 stage doubler is best to implemented for this application.

The design of the printed circuit board (PCB) was carried out using DipTrace software. The material used to

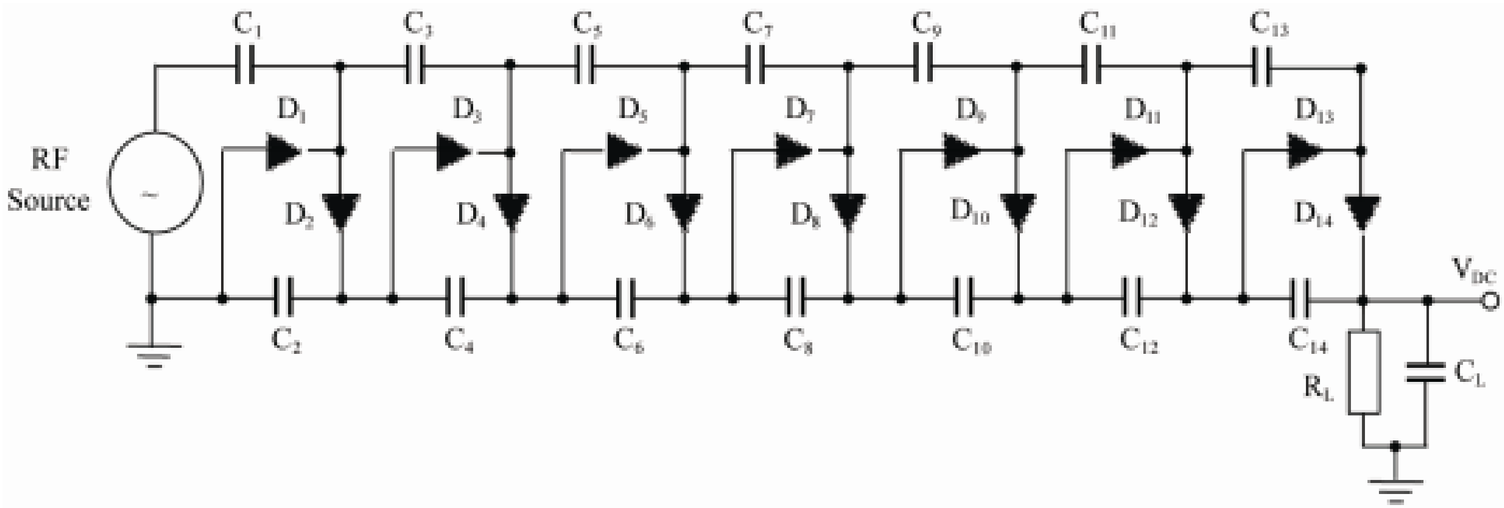


Figure 6. Schematic of 7 stage voltage multiplier.

4. Results and Analysis

The simulated and measured results at the output voltage of voltage multiplier circuit are shown graphically in **Figure 8**. From the graph analysis, the simulated and the measured results agree considerably with each other. The measured results are shown to be better than the simulation results. The reason behind this may be due to the uncertainty in series resistance value of the diode obtained from SPICE parameters in modeling as explained in Equation (5). This resistance vale of diodes in practical circuit may be lower than in the model, which provides fast discharge path, in turn rise in voltage as passes through the stages and reaches to final output. In this work, the DC output voltages obtained through simulation and measurement at 0 dBm re 2.12 V and 5.0 V respectively. These results are comparatively much better than in ref. [9], where in at 0 dBm, 900 MHz they achieved 0.5 V and 0.8 V through simulation and measurement increasing to 1.4 V, 1.67 V, 1.87 V and 2.12 V for 4, 5, 6 and 7 stages respectively compared to 2 mS as shown in [10]. **Figure 12** shows that the conversion ratio of 22 is achieved at 0 dBm input power and drops to 2.5 at –40 dBm. The highest value at 0 dBm is due to the innate characteristics of the zero bias Schottky diodes which conduct fairly well at higher input voltages.

5. Conclusion

From the experimental results, it is found that the pro-

Table 2. Component used in 7 stage voltage multiplier.

Name of component	Label	Value
Stage capacitors	C_1 - C_{14}	3.3 nF
Stage diodes	D_1 - D_{14}	HSMS 2850
Filter capacitor	C_L	100 nF
Load resister	R_L	100 kΩ

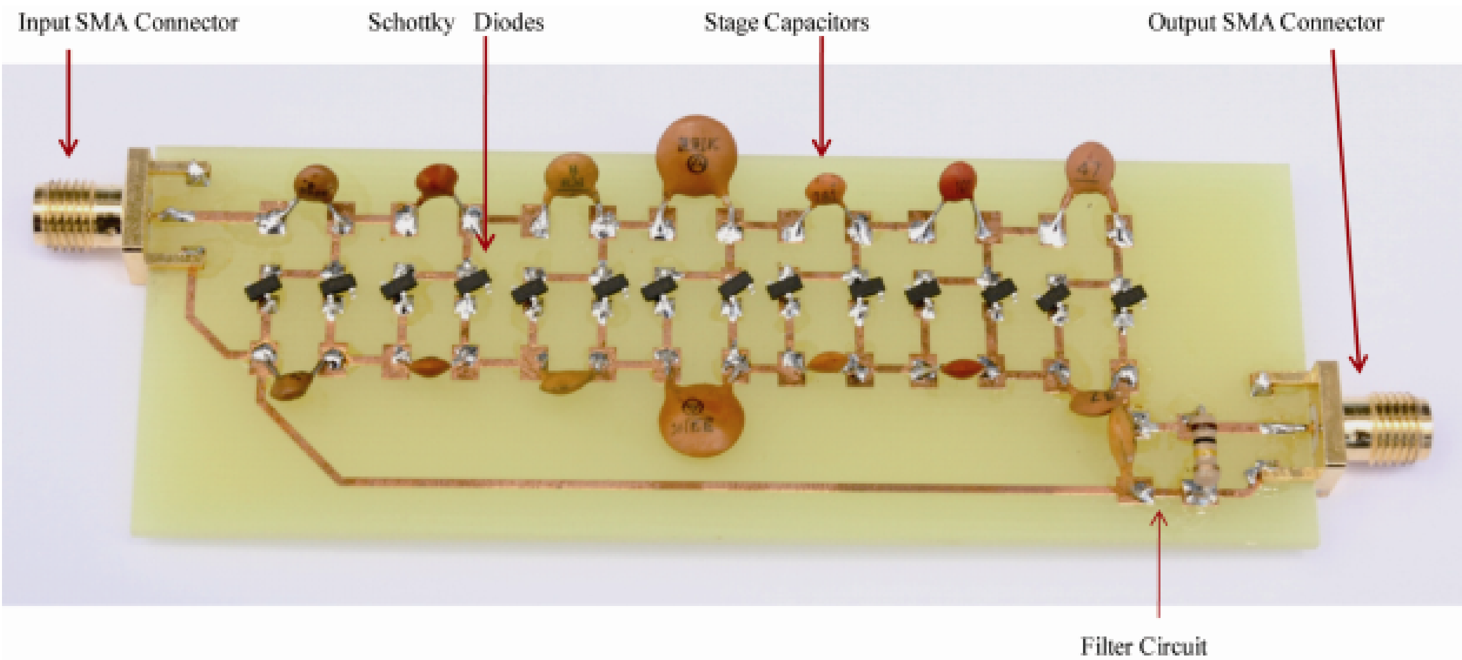


Figure 7. Photograph of assembled circuit board.

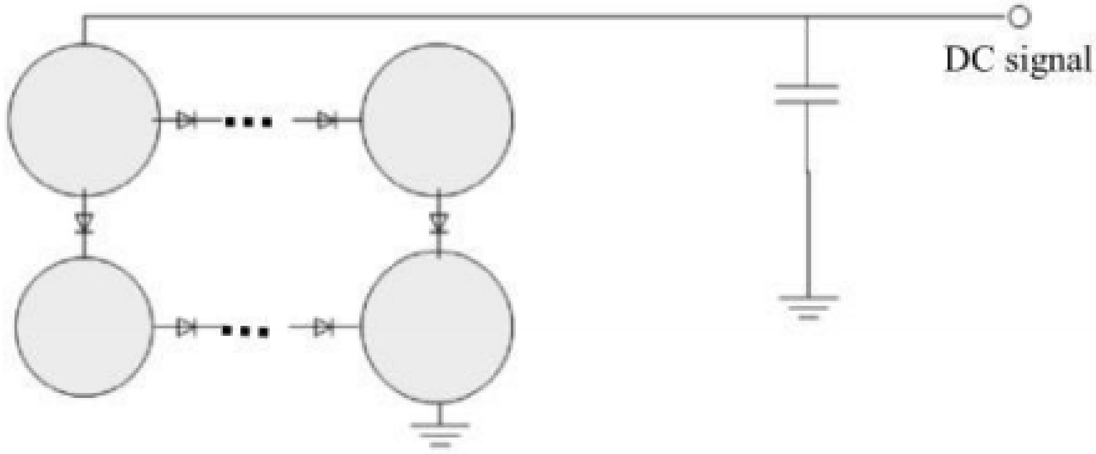


Fig.3.28: The rectenna array scheme

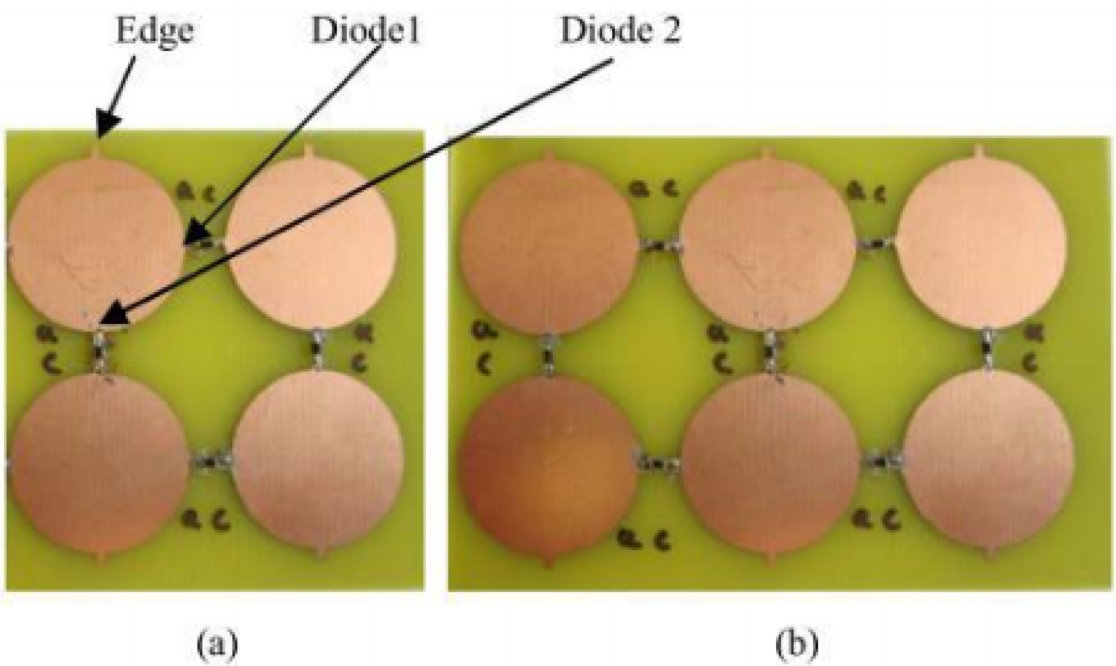


Fig. 3.29: (a) a two-element rectenna array. (b) a three- element rectenna array

incoming signals must be coherent (same) in phase and amplitude. When they are in phase and amplitude, the voltage potential at each end of the rectifier will be same so no power will be dissipated. Using the reverse method of Wilkinson power combiner in antenna section, this divider was constructed with isolation and return loss described there.

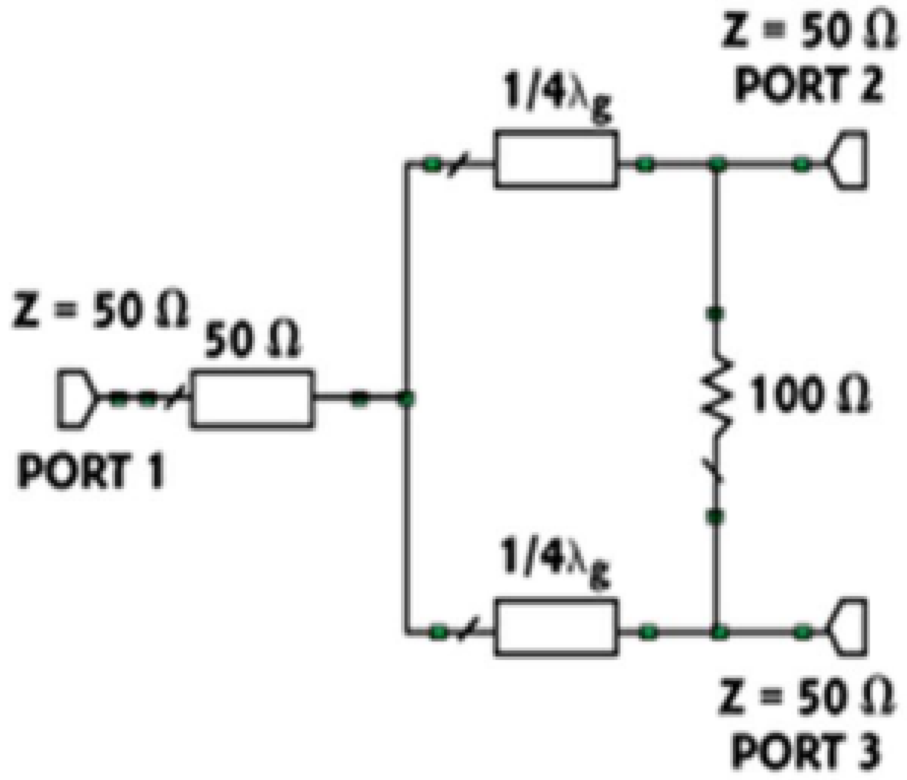


Figure 28 Wilkinson power divider configuration

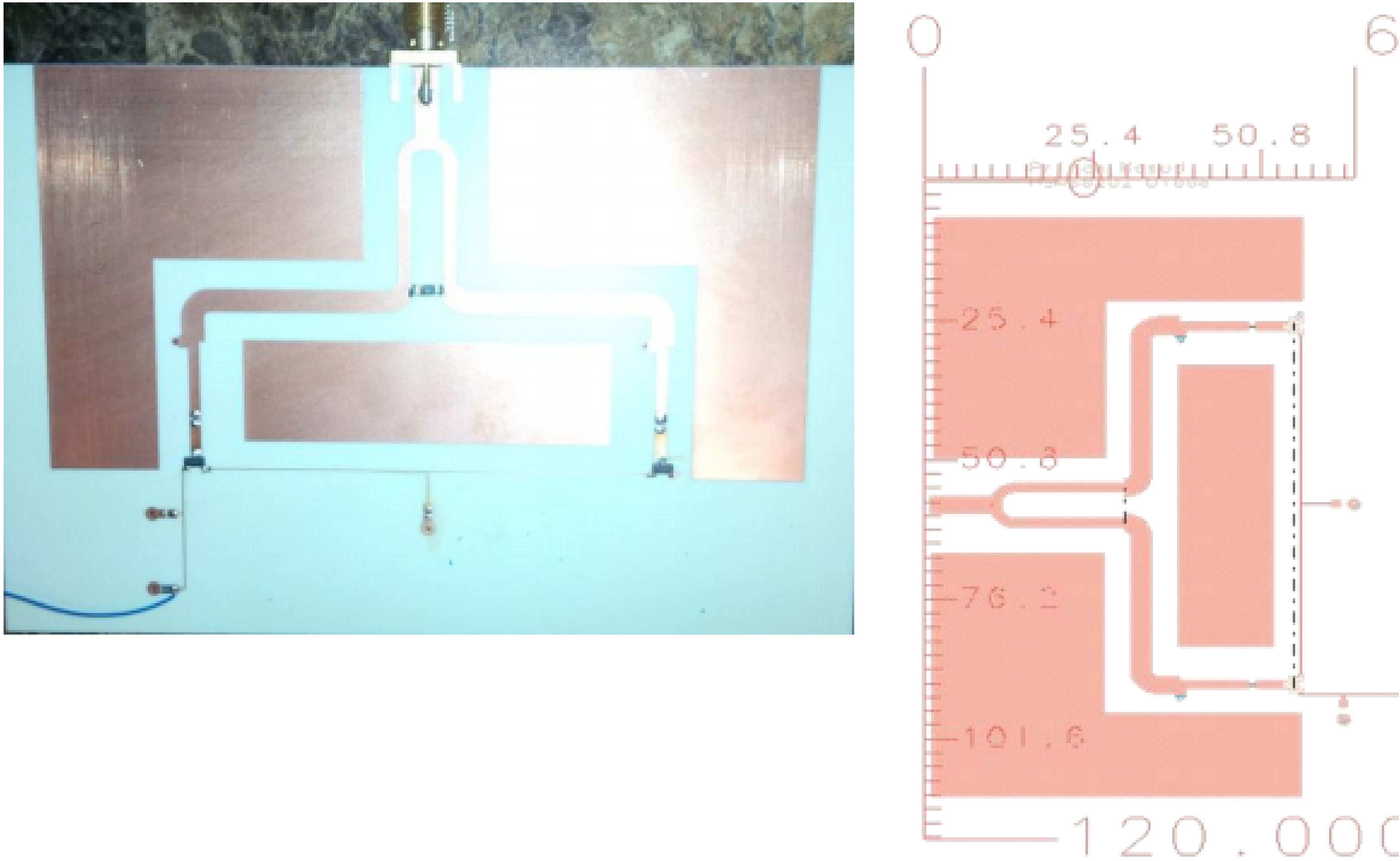


Figure 29 Fabricated Rectifier and its ADS layout

3.4.7 Efficiency Calculation

4.1 *Measured Antenna Performance*

The fabricated antenna is shown in following figure. Actual lab measurement of the antenna's radiation pattern was made in RIM's RF anechoic chamber; Both VSWR and Input Impedance were obtained using an Agilent Technologies 8714C Network Analyzer. The measurement of these data can provide useful information about the expected antenna's performance.

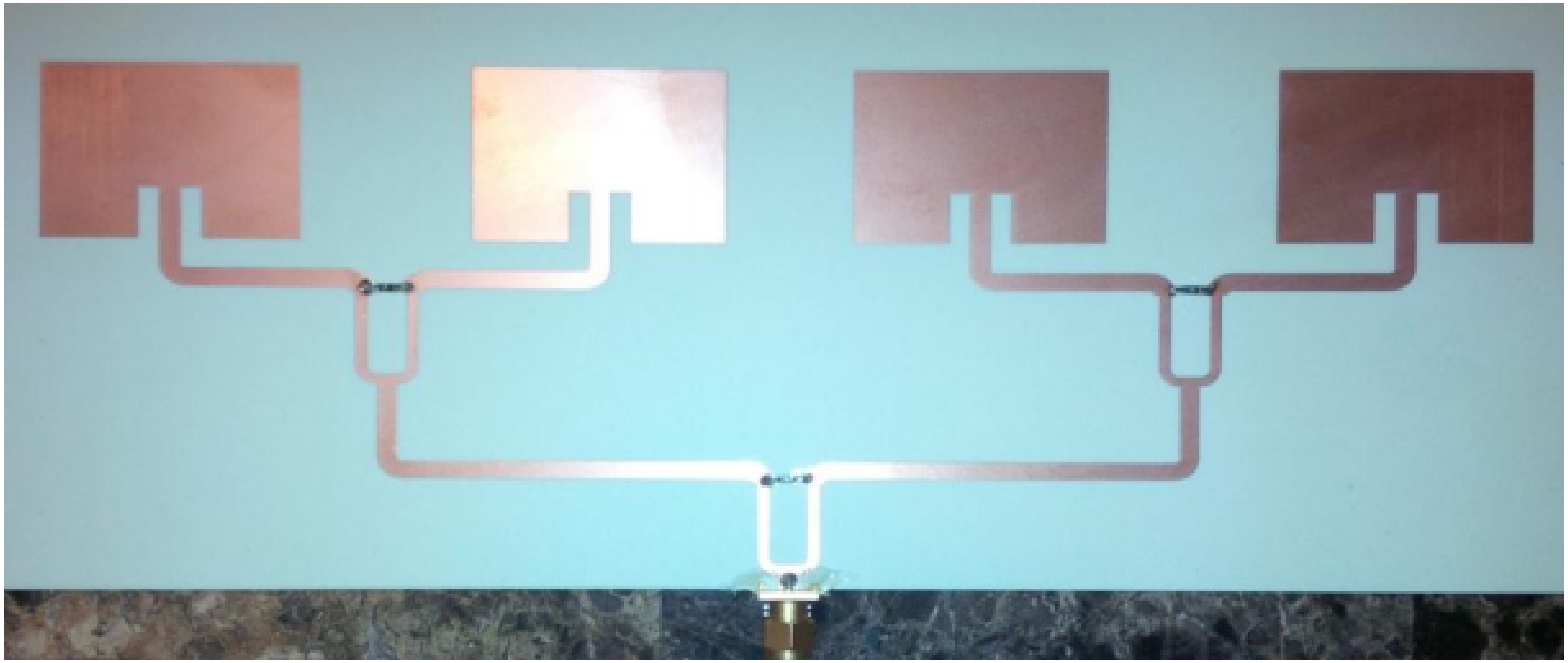


Figure 30 Fabricated Final Antenna

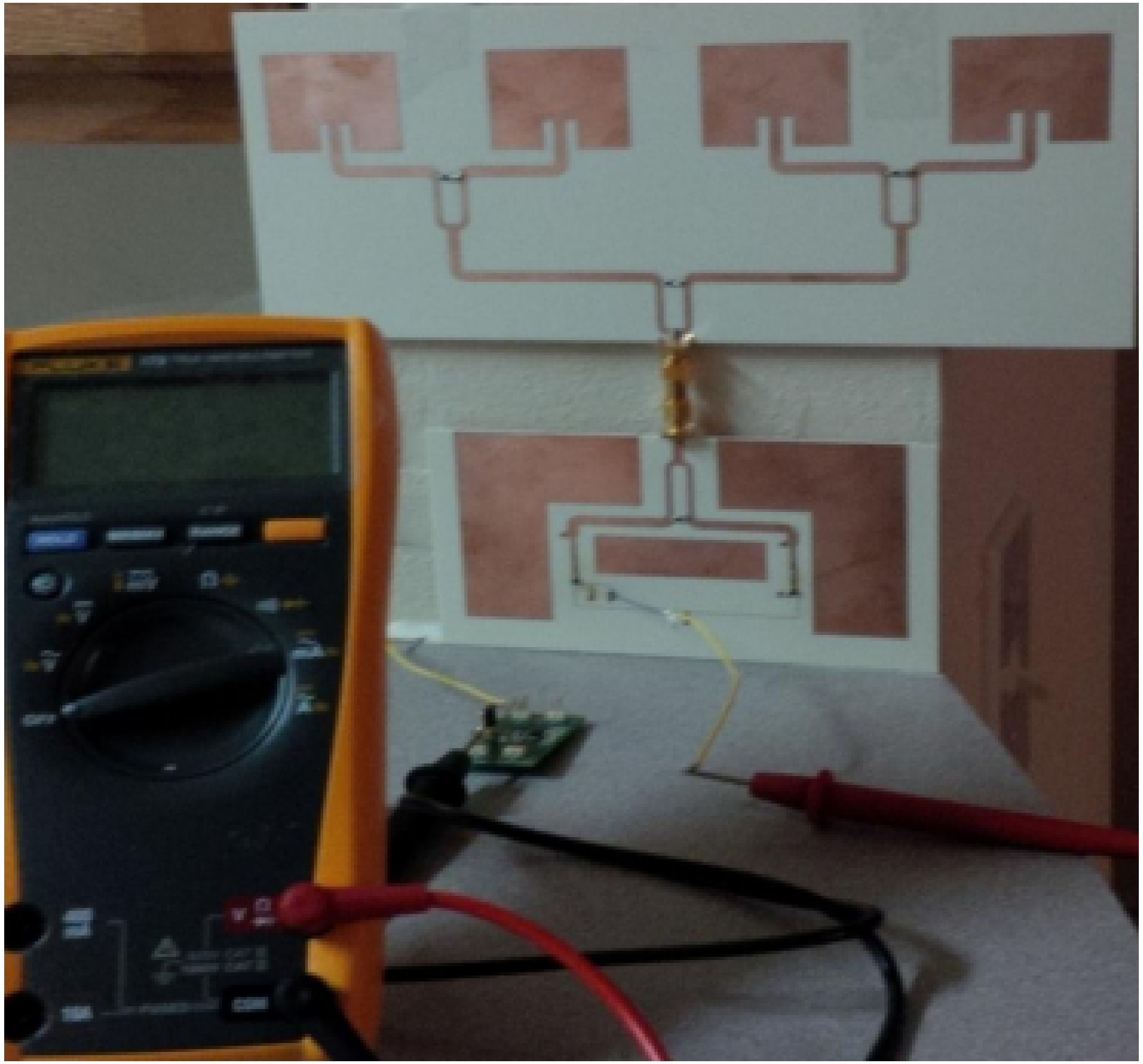
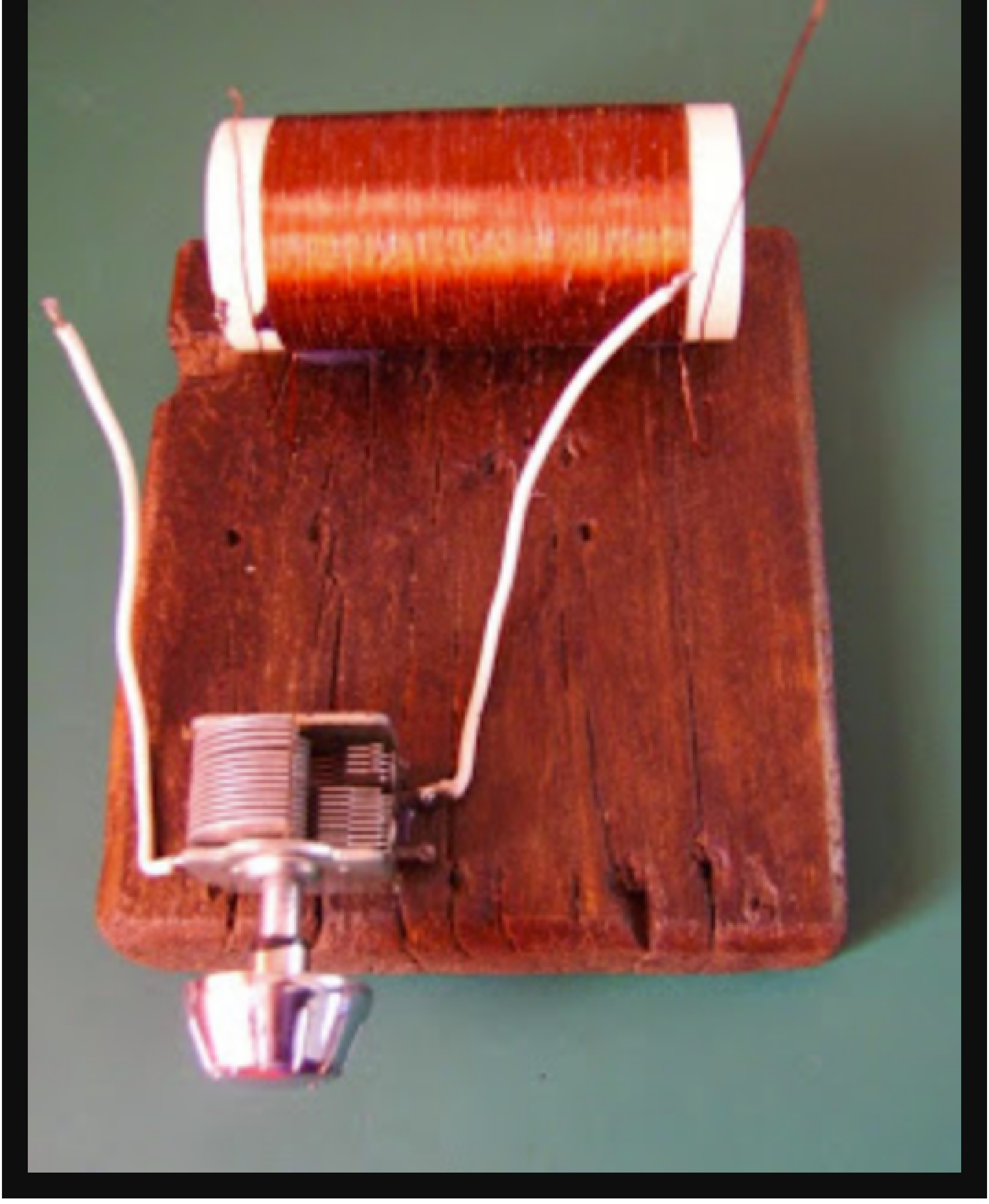
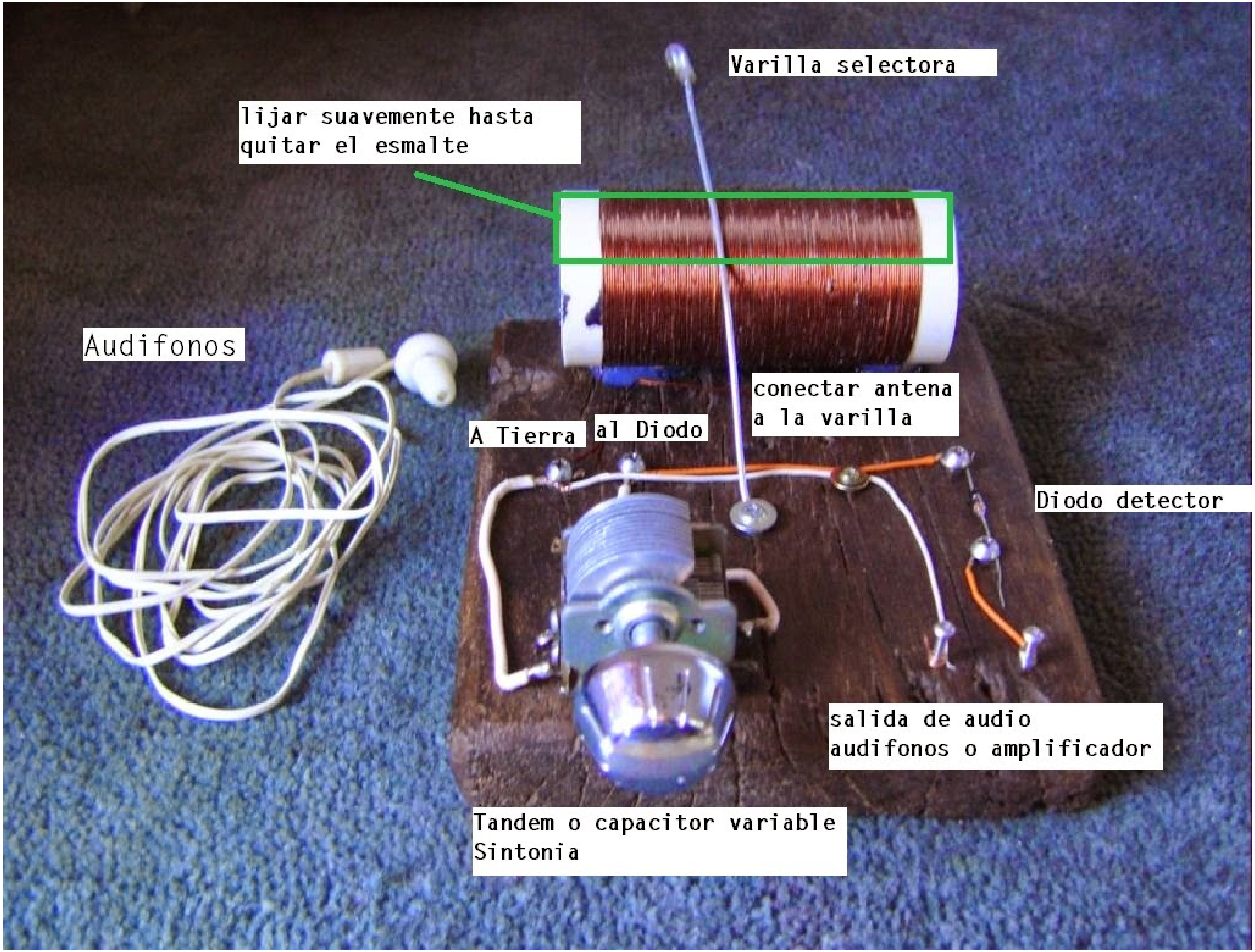


Figure 33 Complete rectenna circuit using HSMS8202




Varilla selectora
lijar suavemente hasta
quitar el esmalte
Audifonos
conectar antena
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Tandem o capacitor variable
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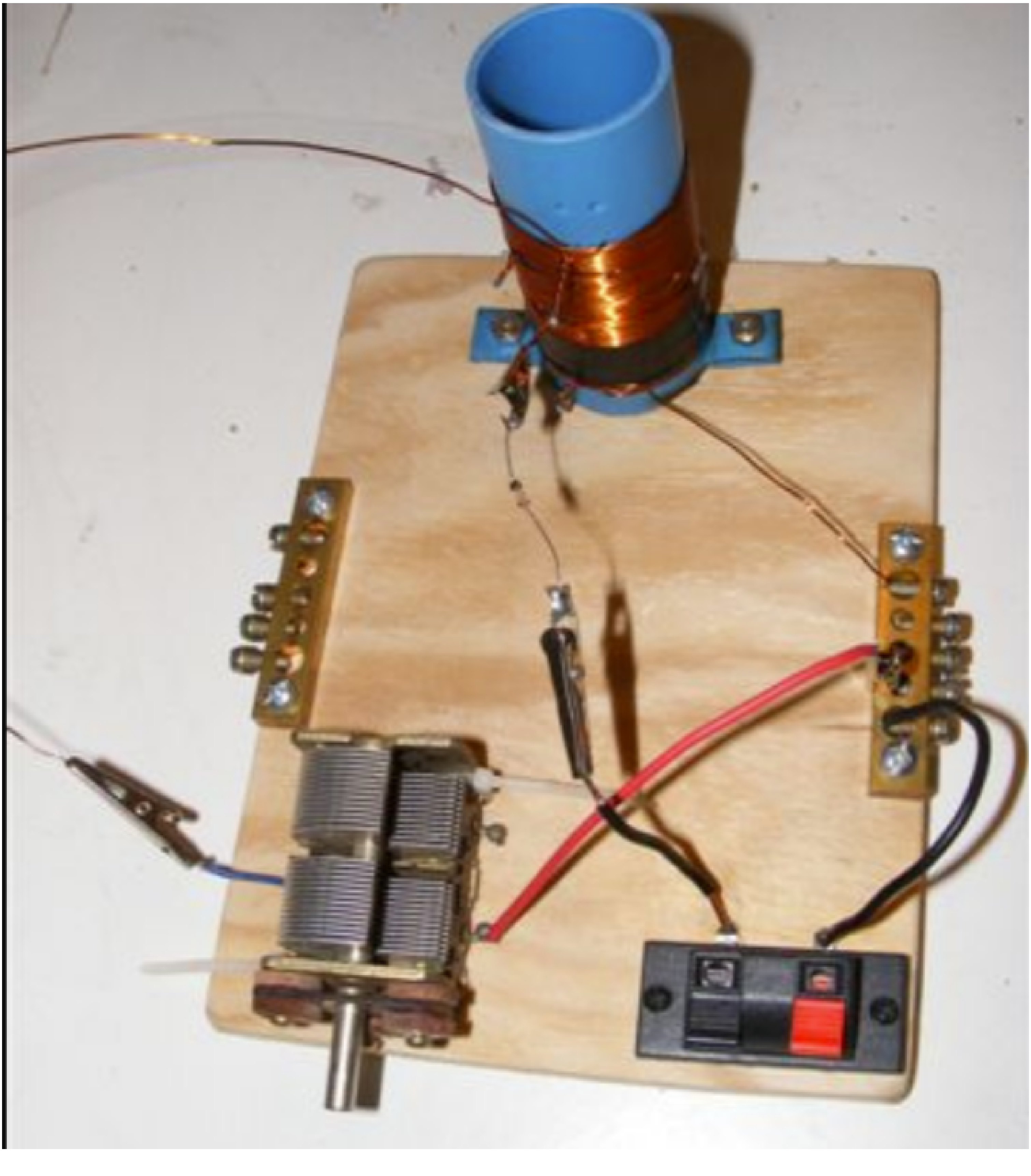

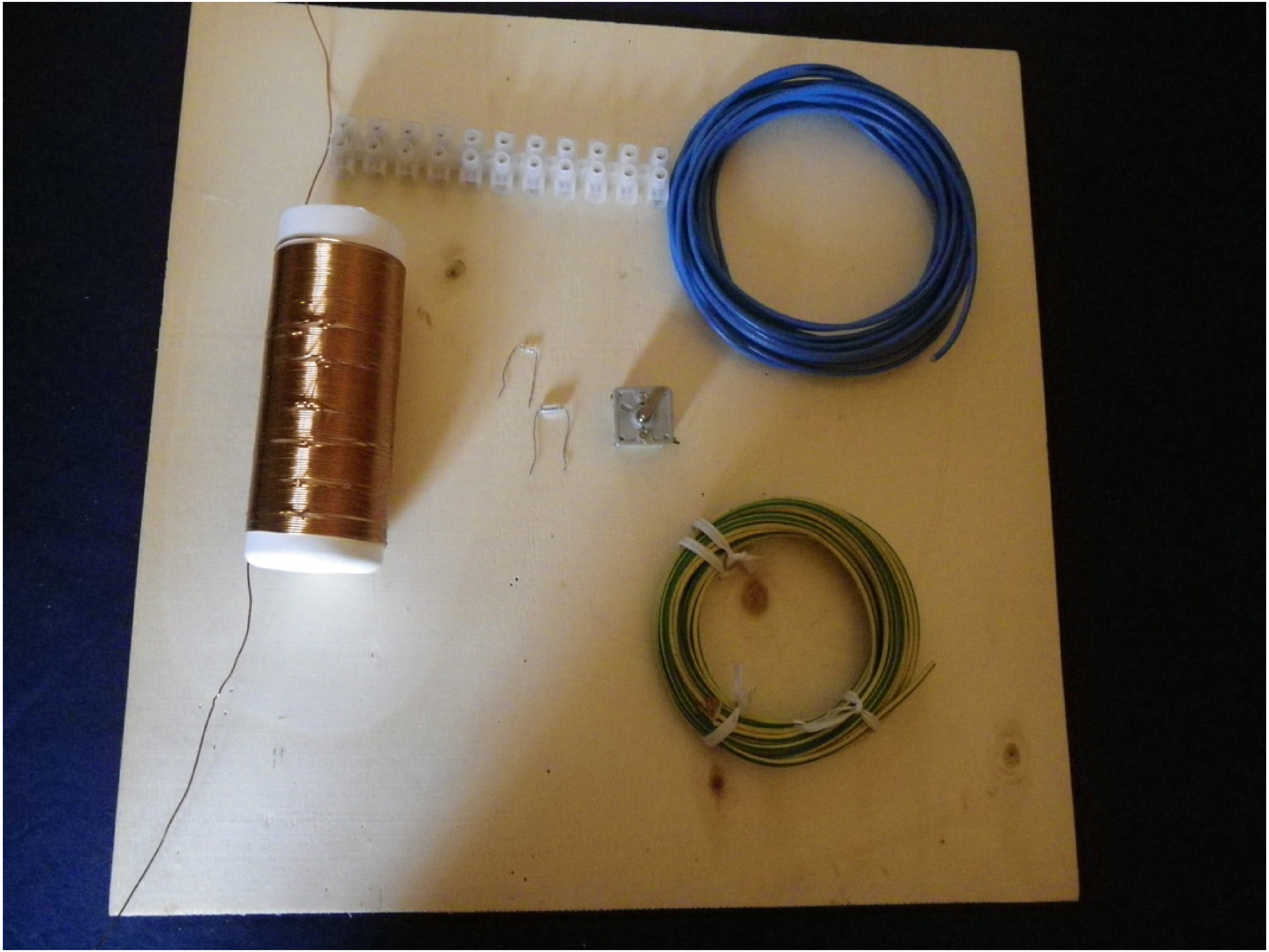

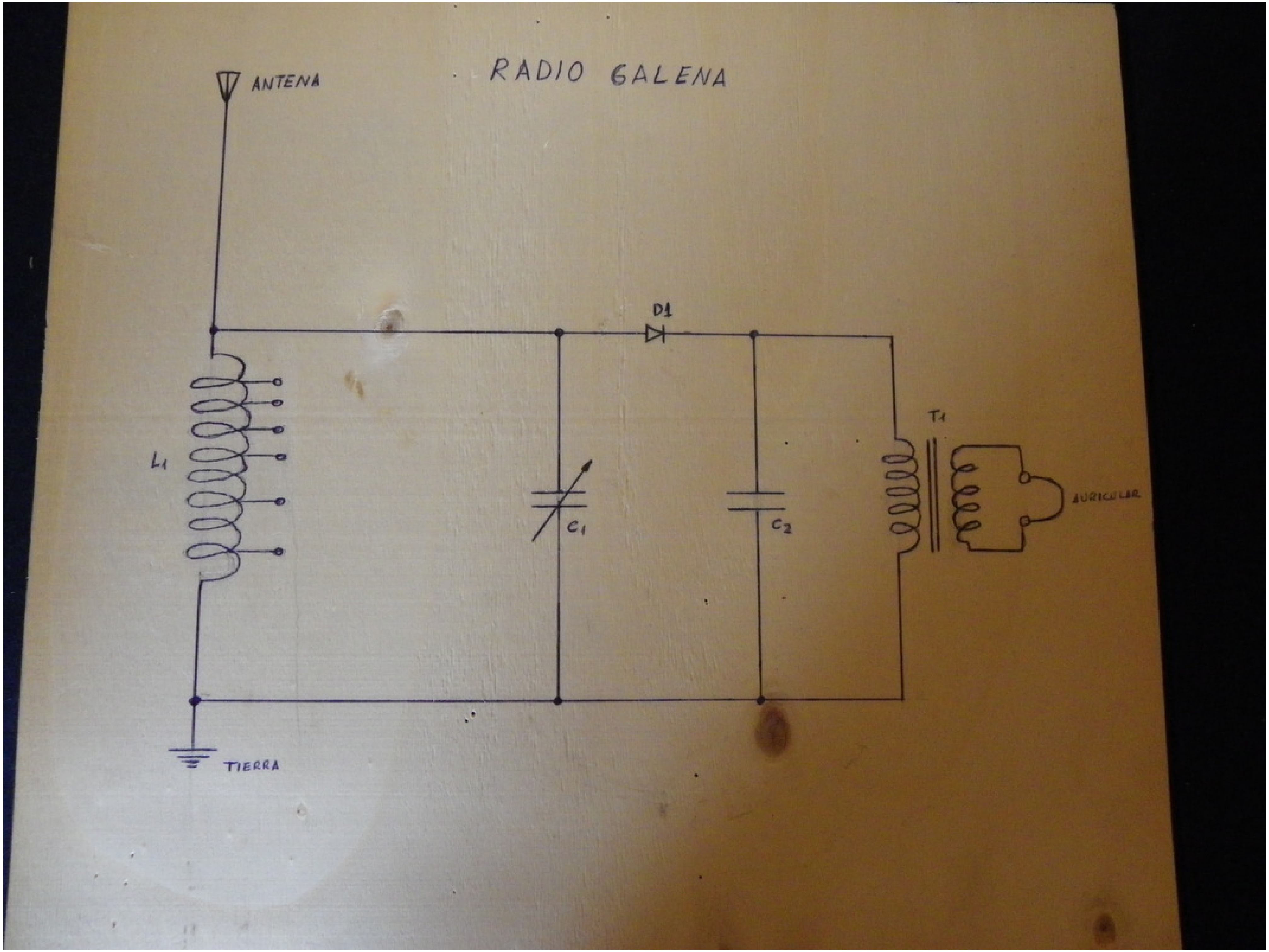
RADIO GALENA
ANTENA
D1
L1
C1
C2
T1
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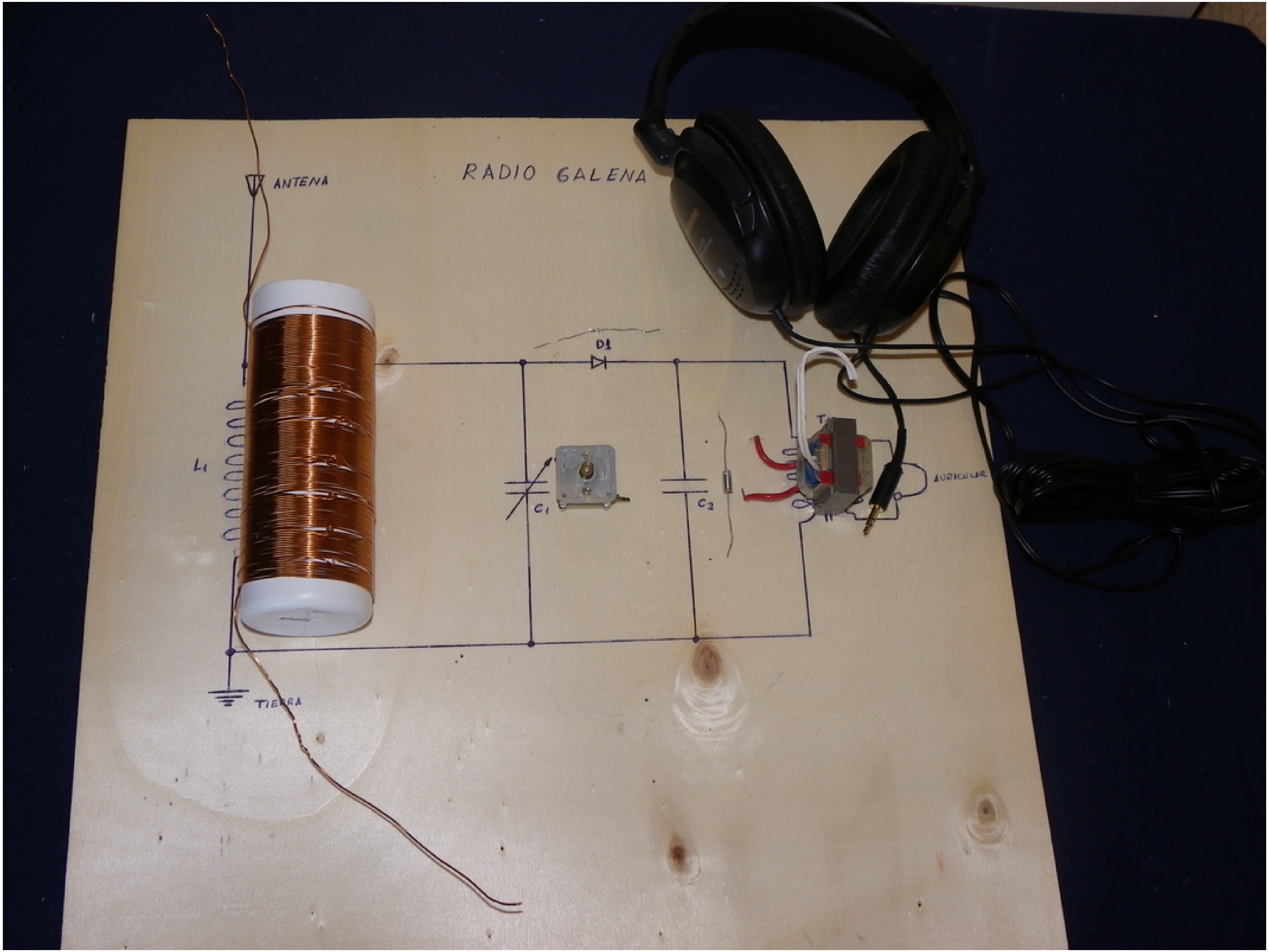
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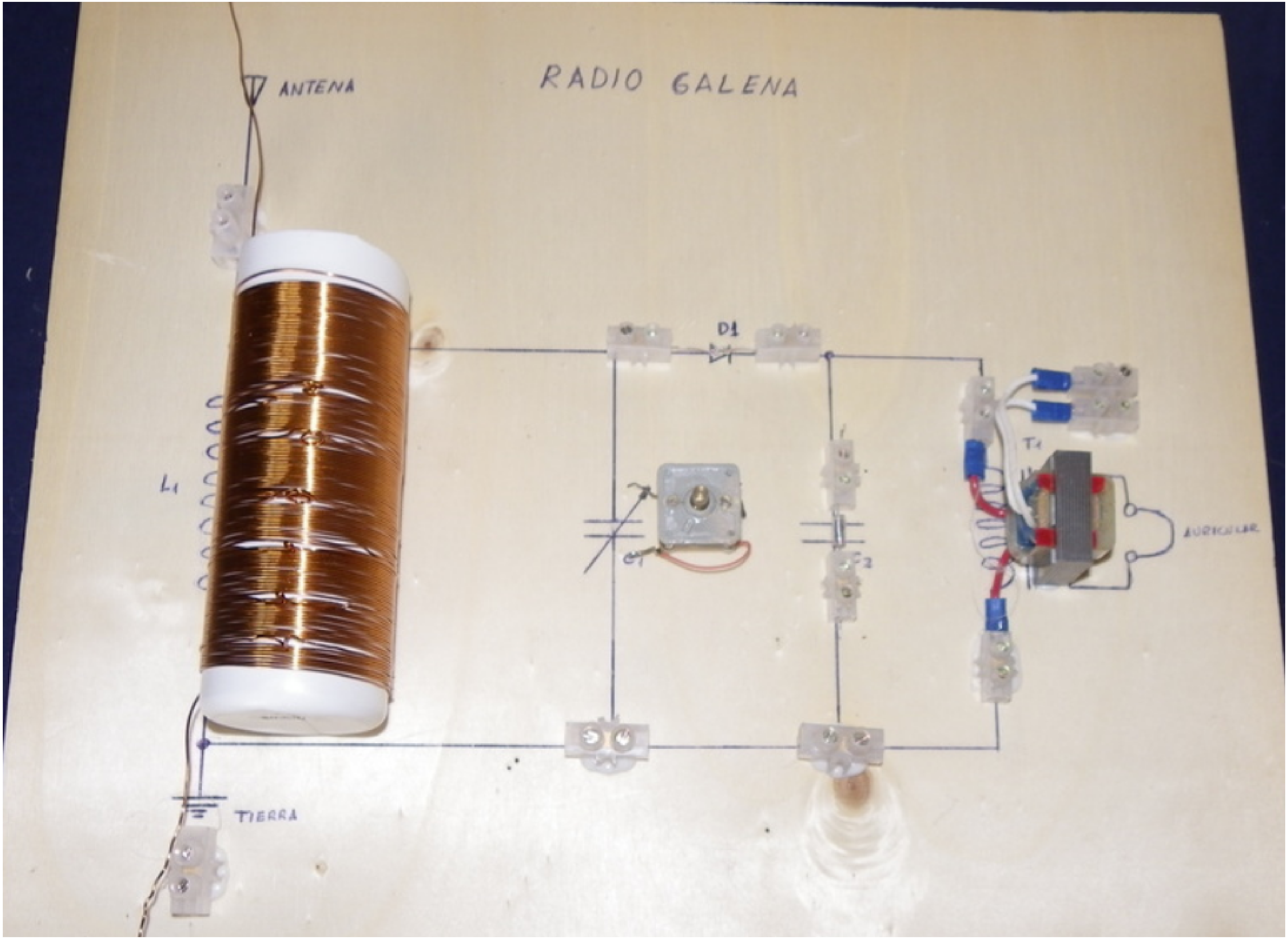
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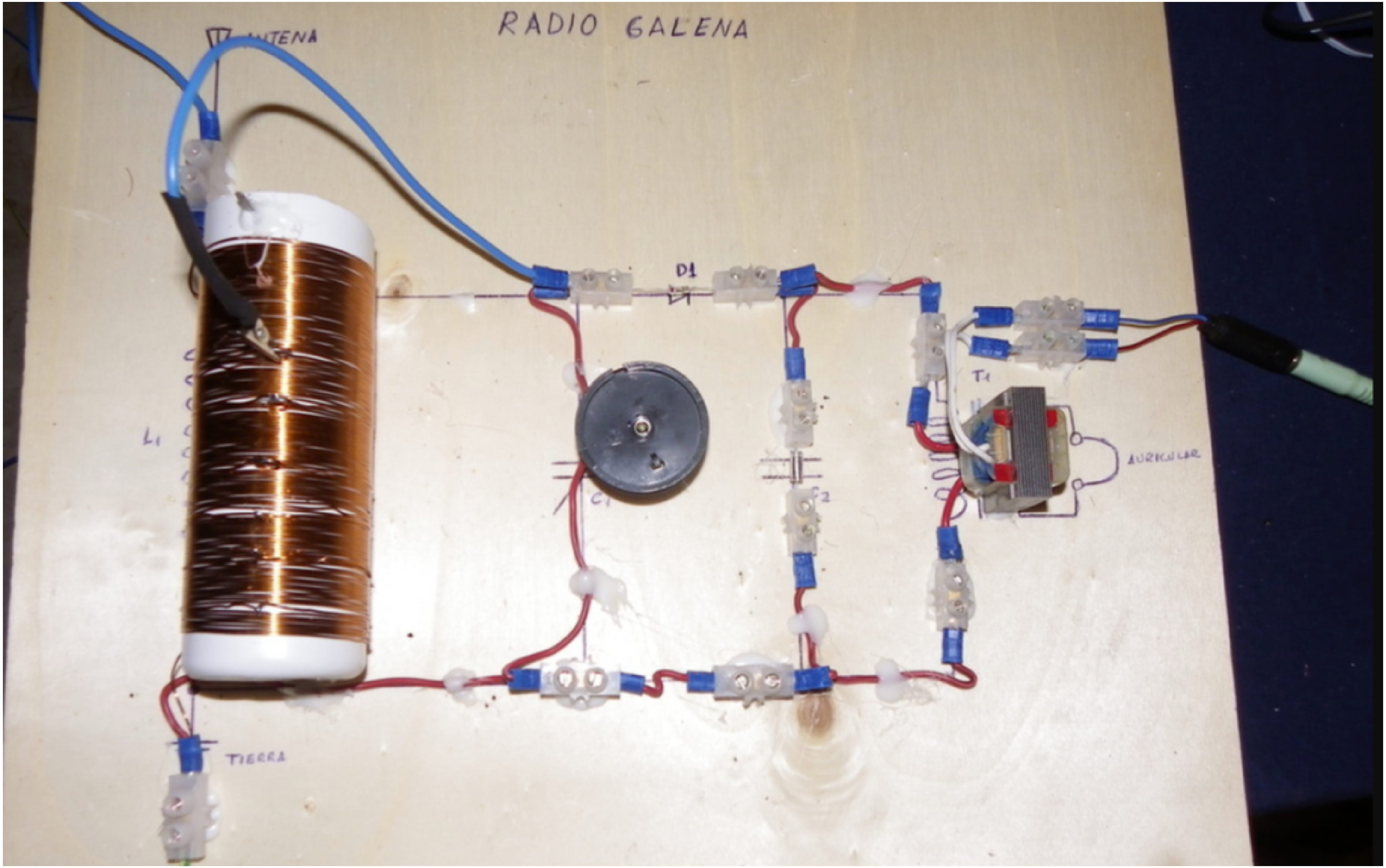
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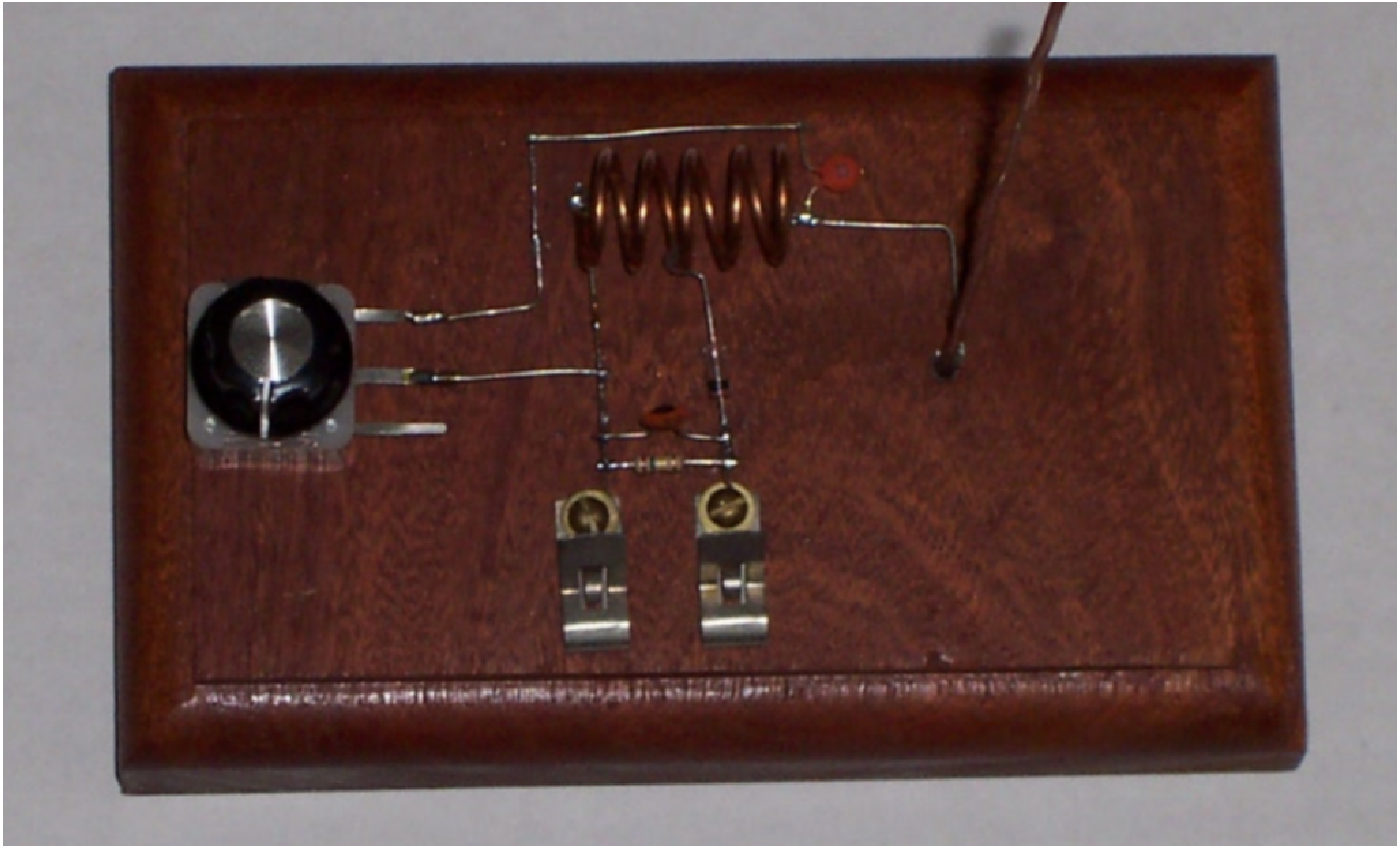
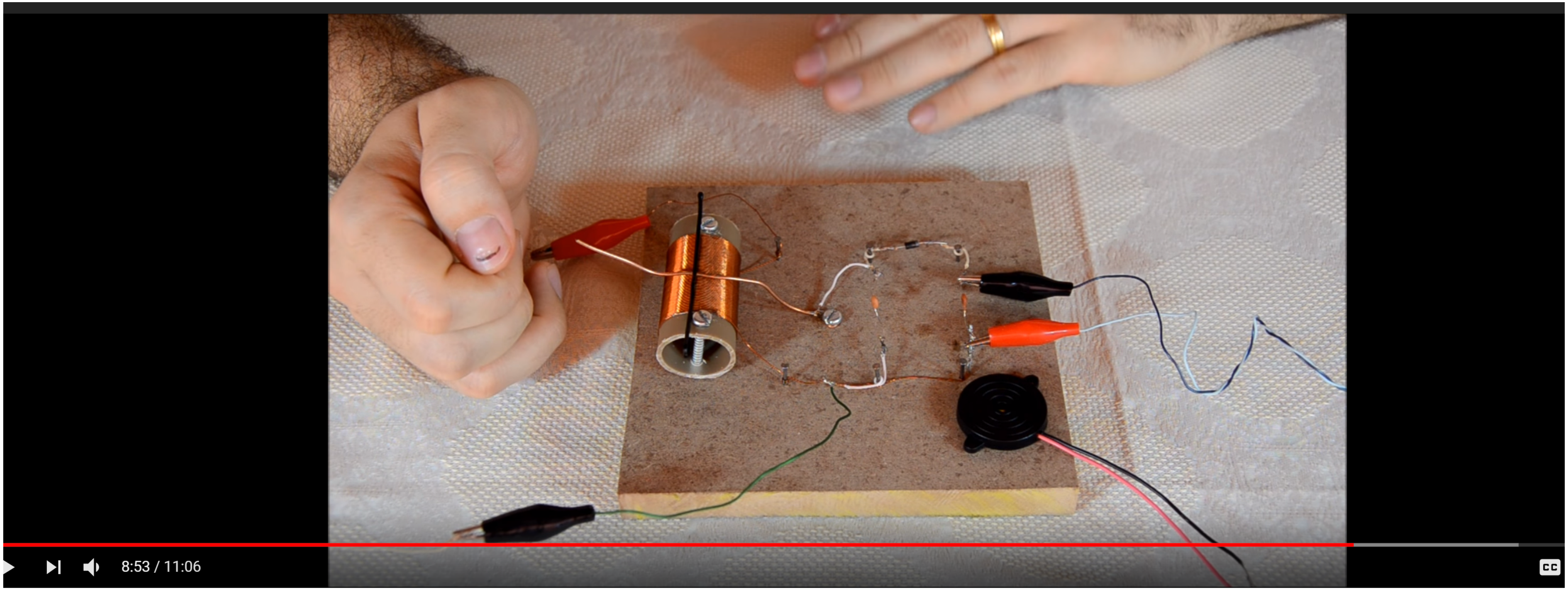
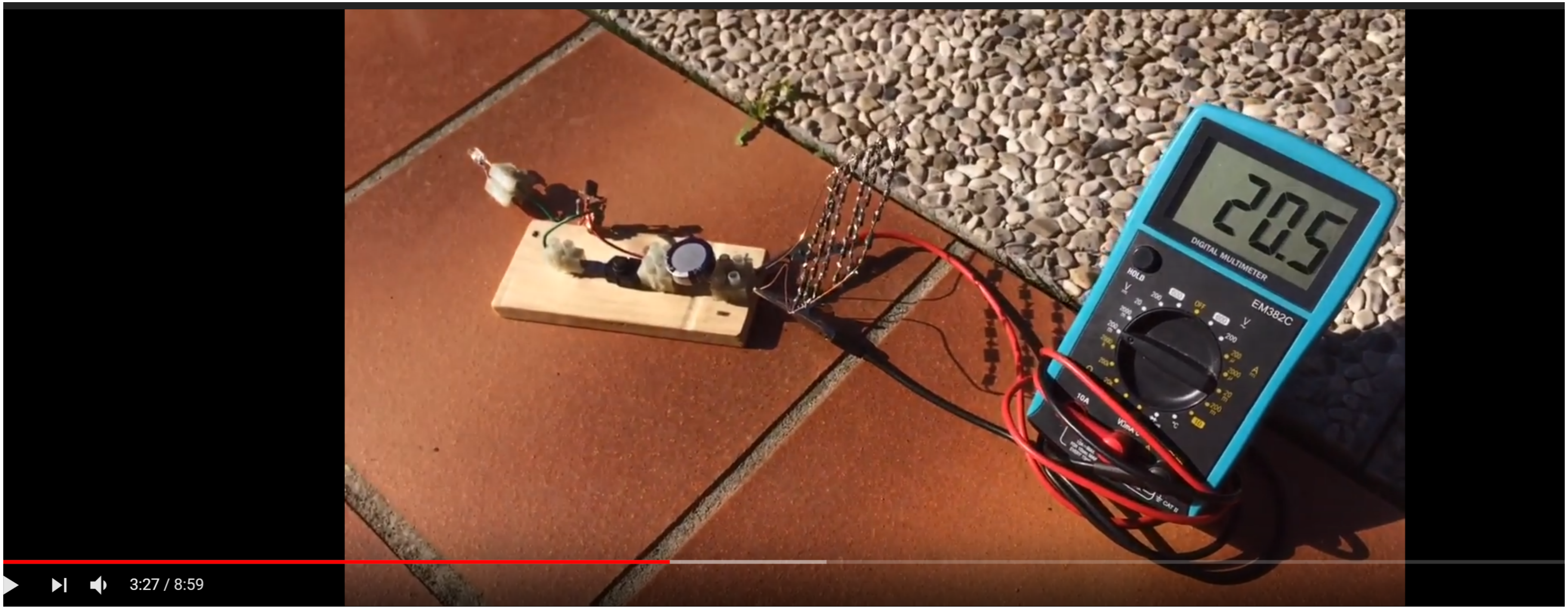


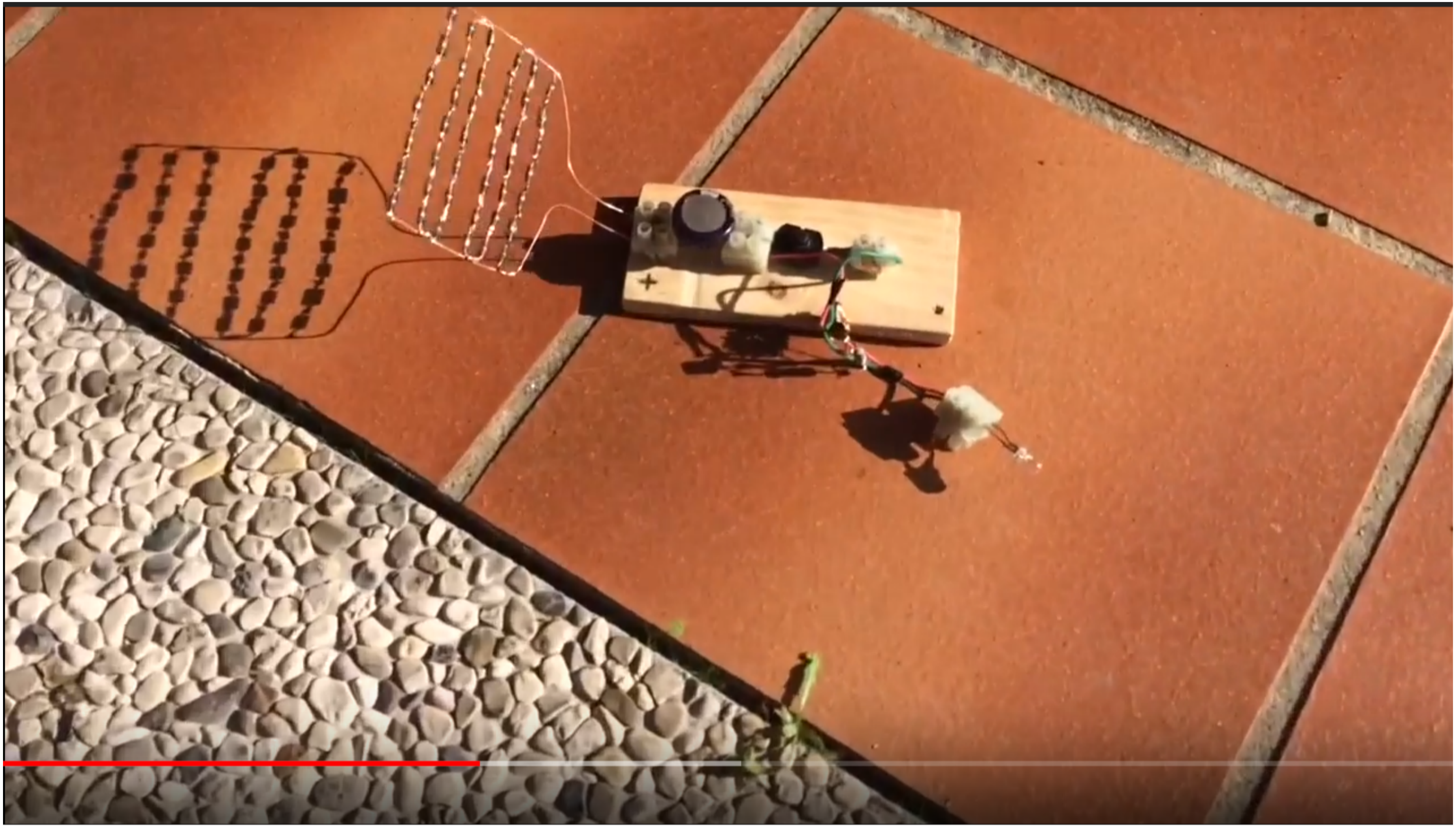


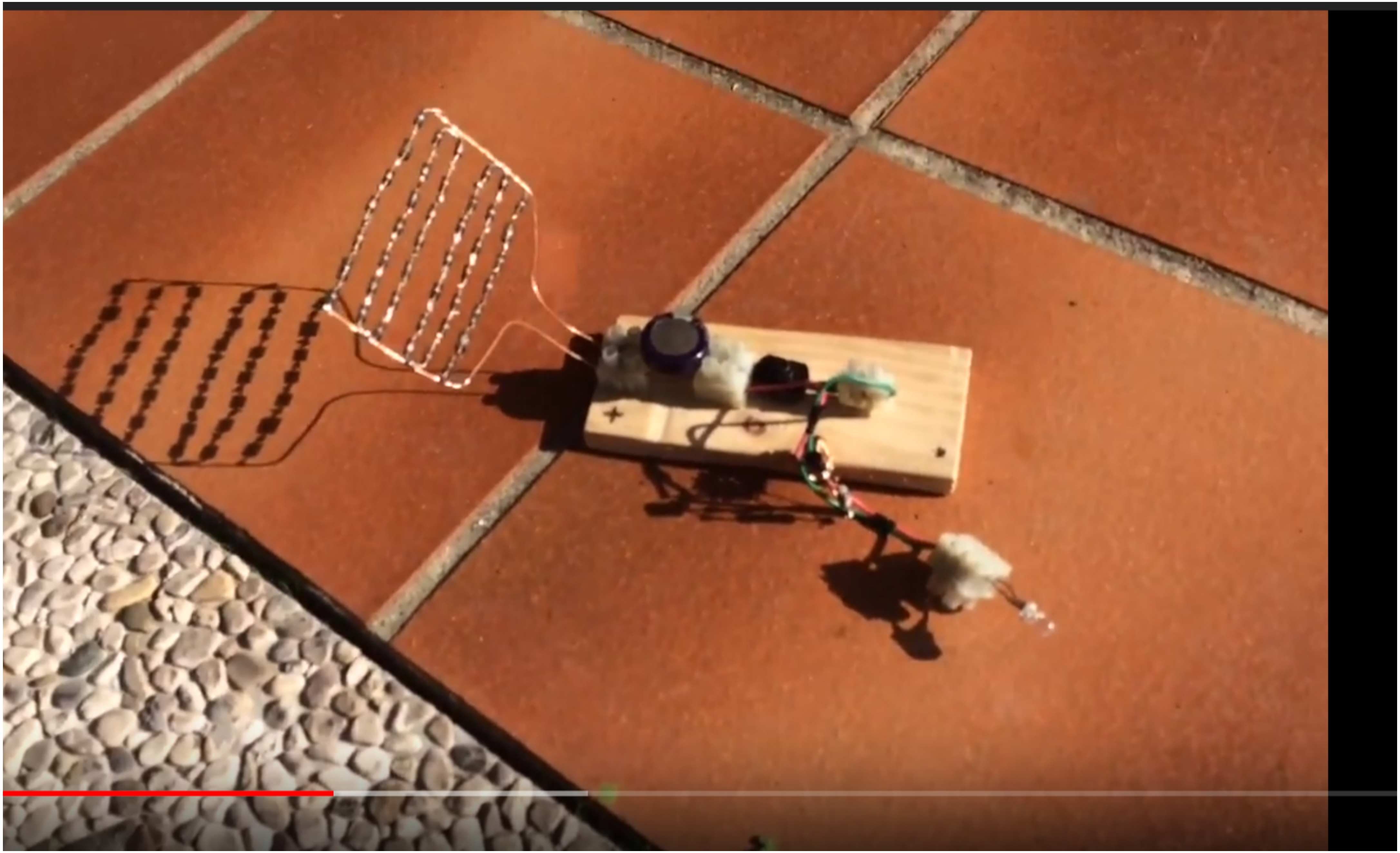
Como fazer um rádio de galena

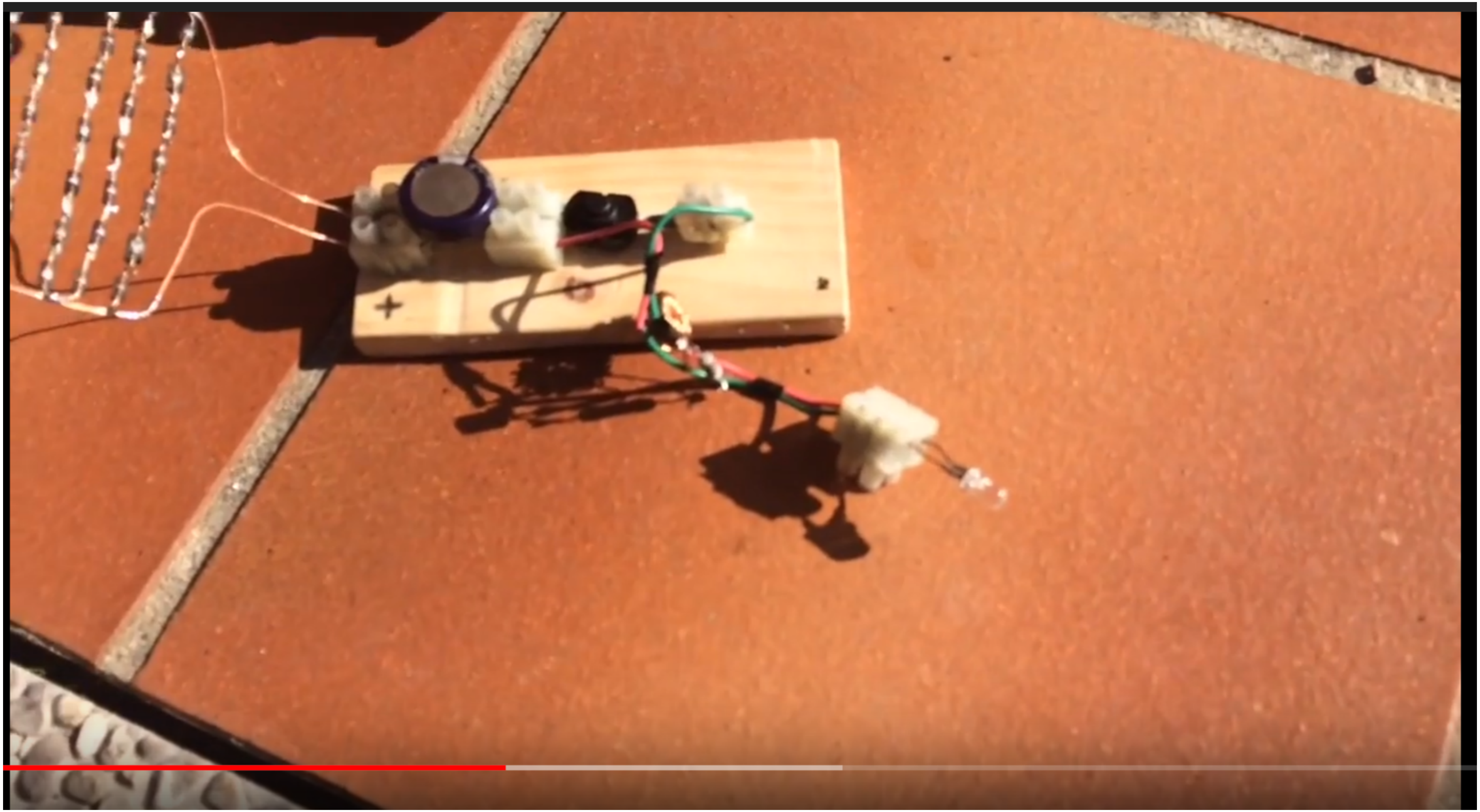


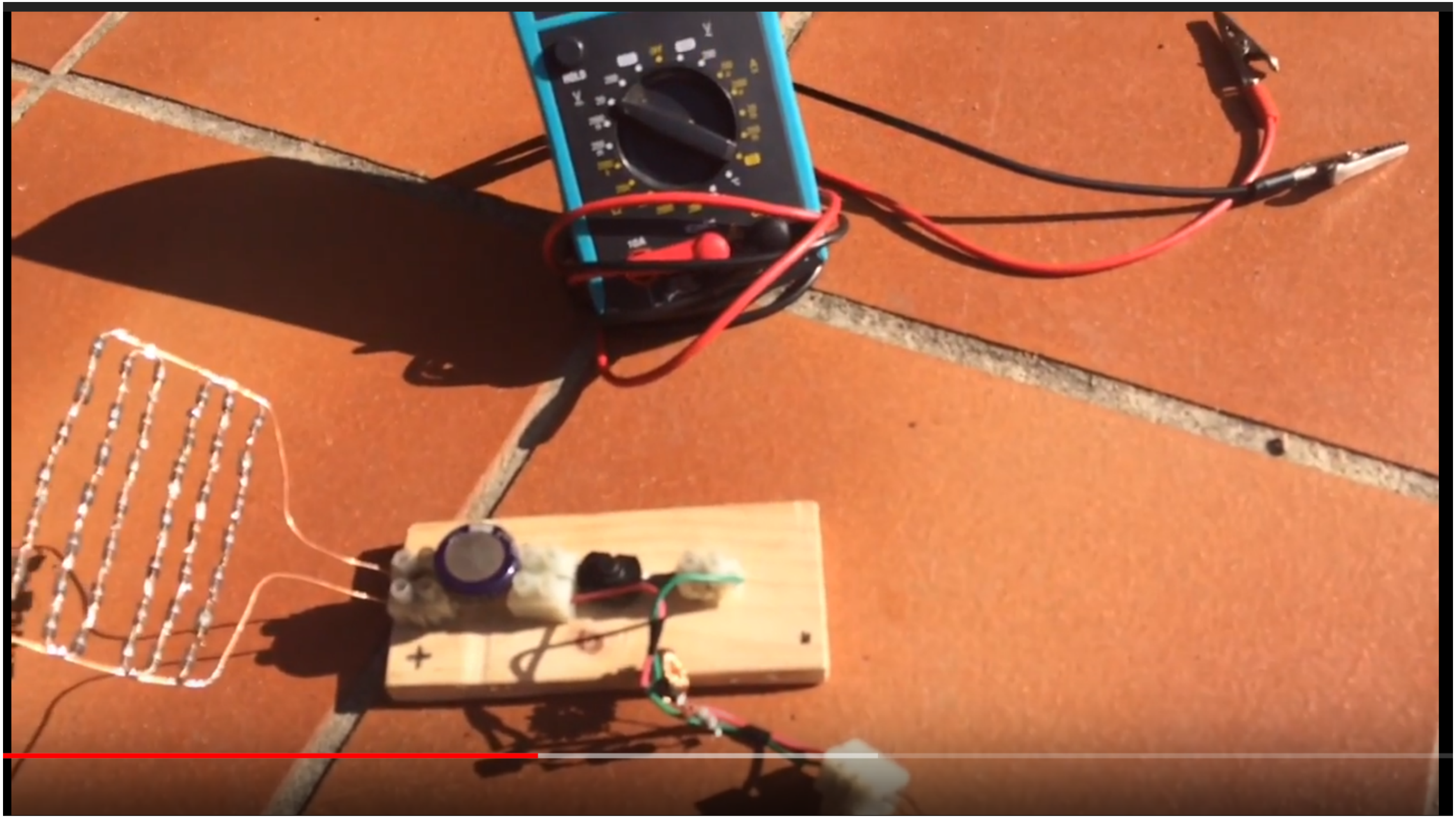
Up next

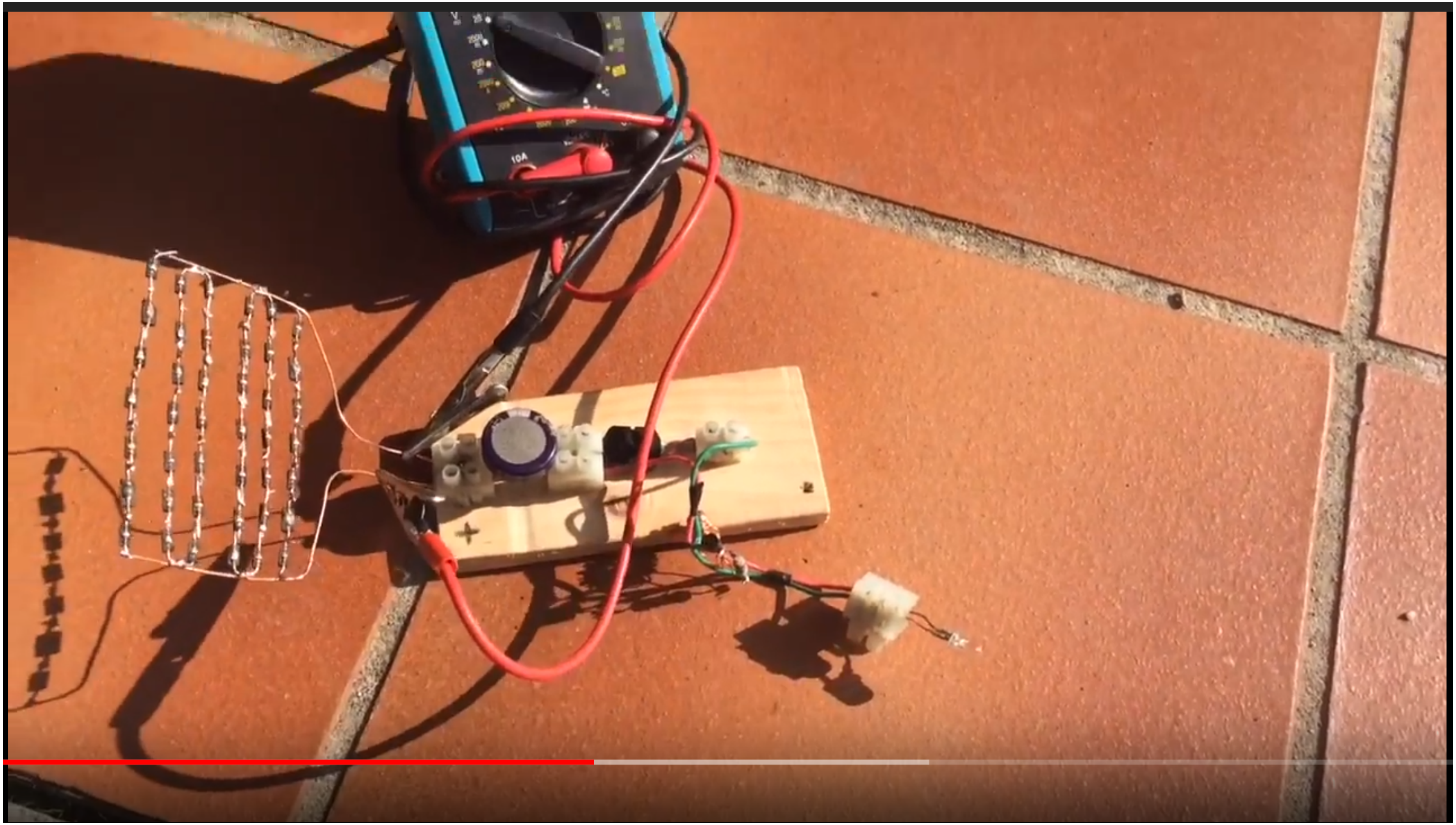
Energia solar con diodos y súpercondensador [#2]







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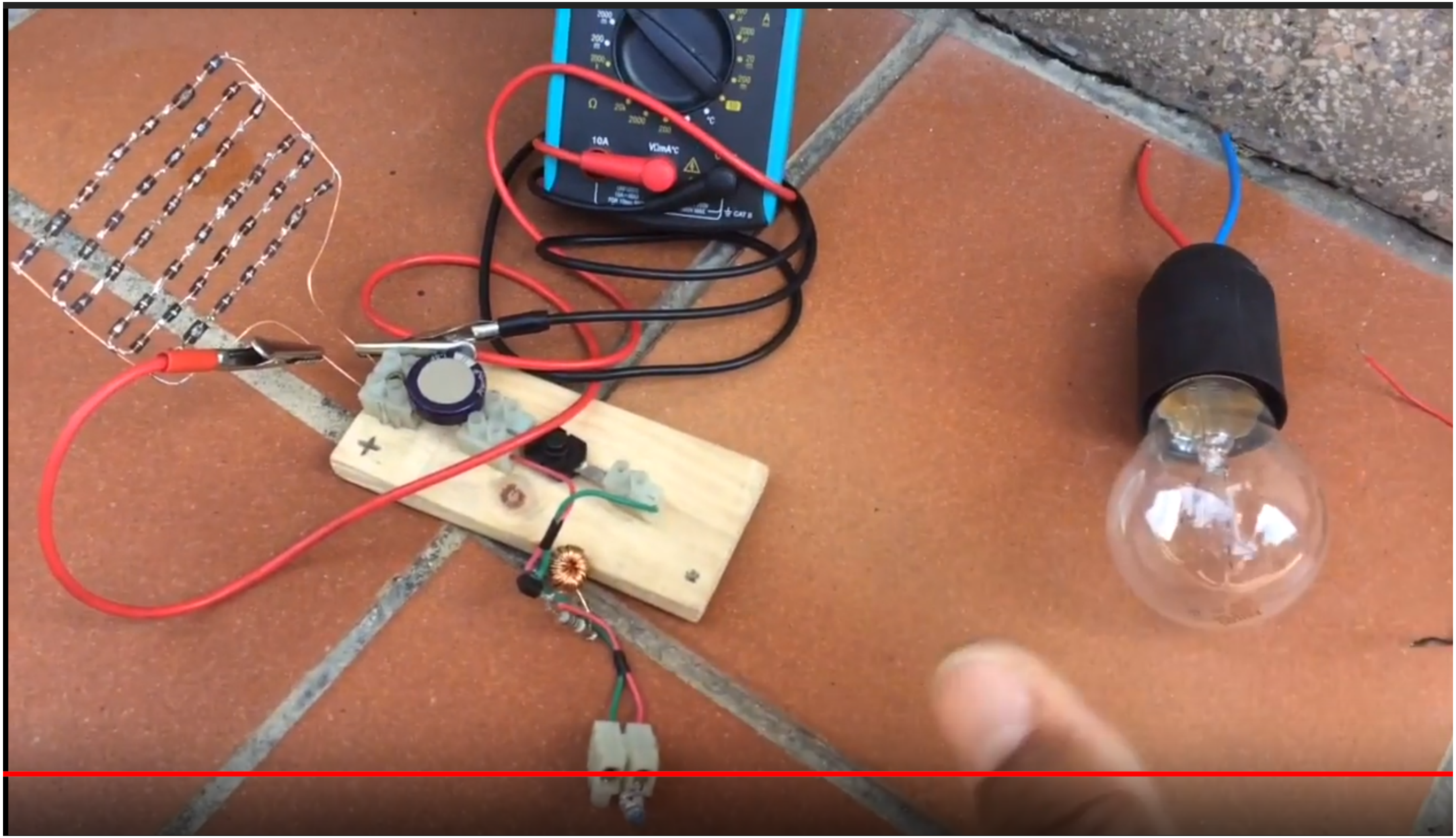
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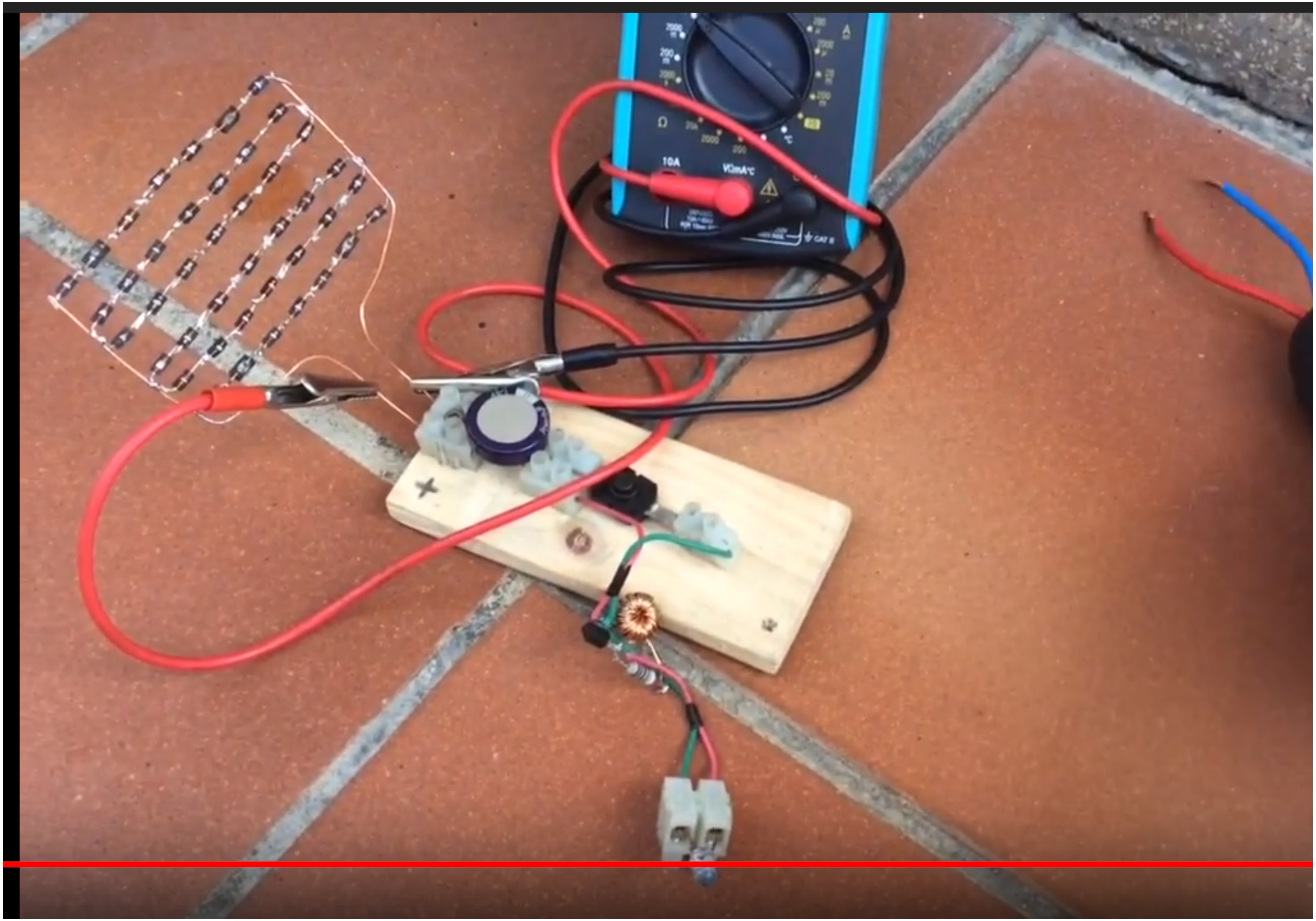
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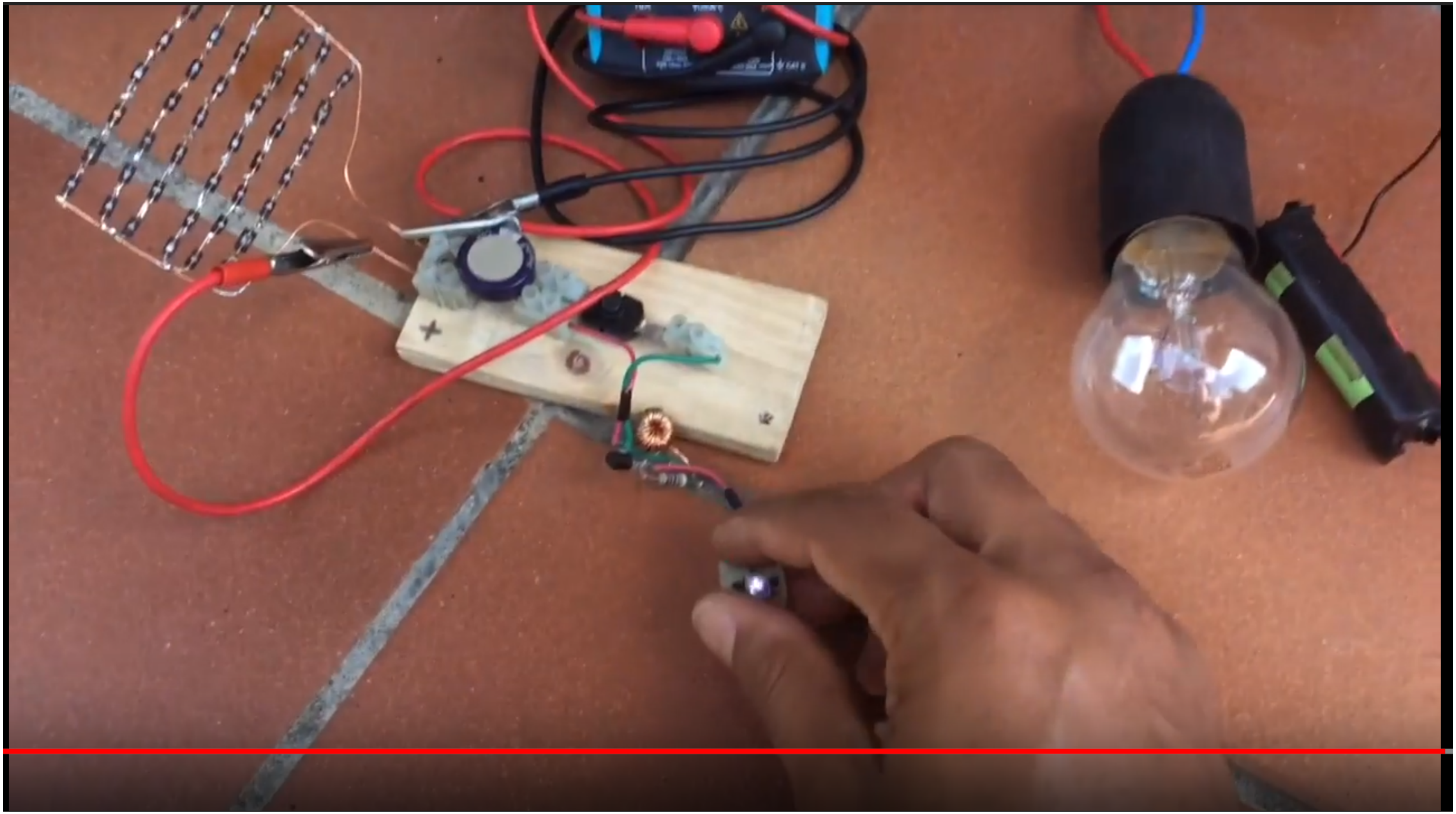
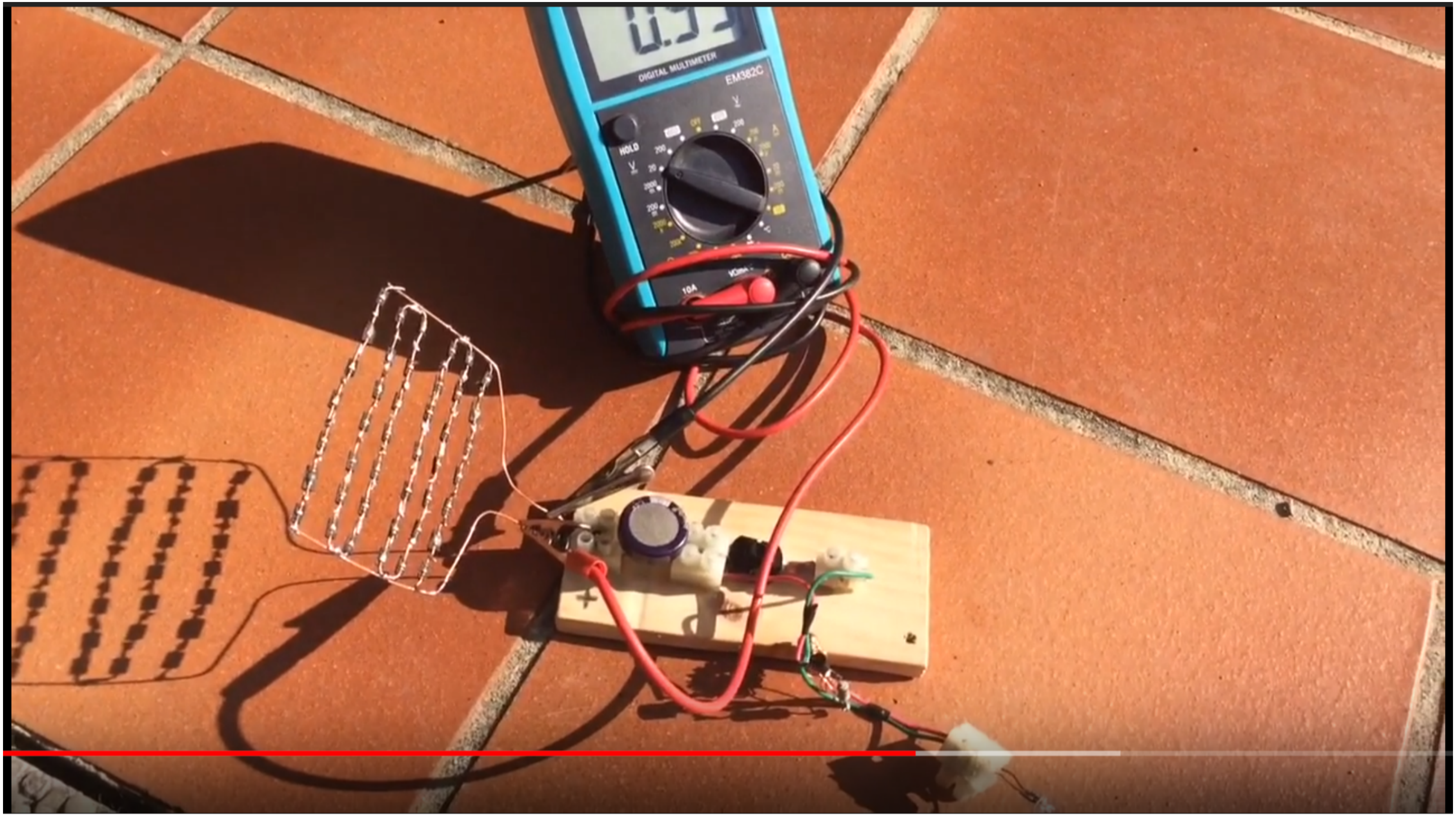
VΩmA°C

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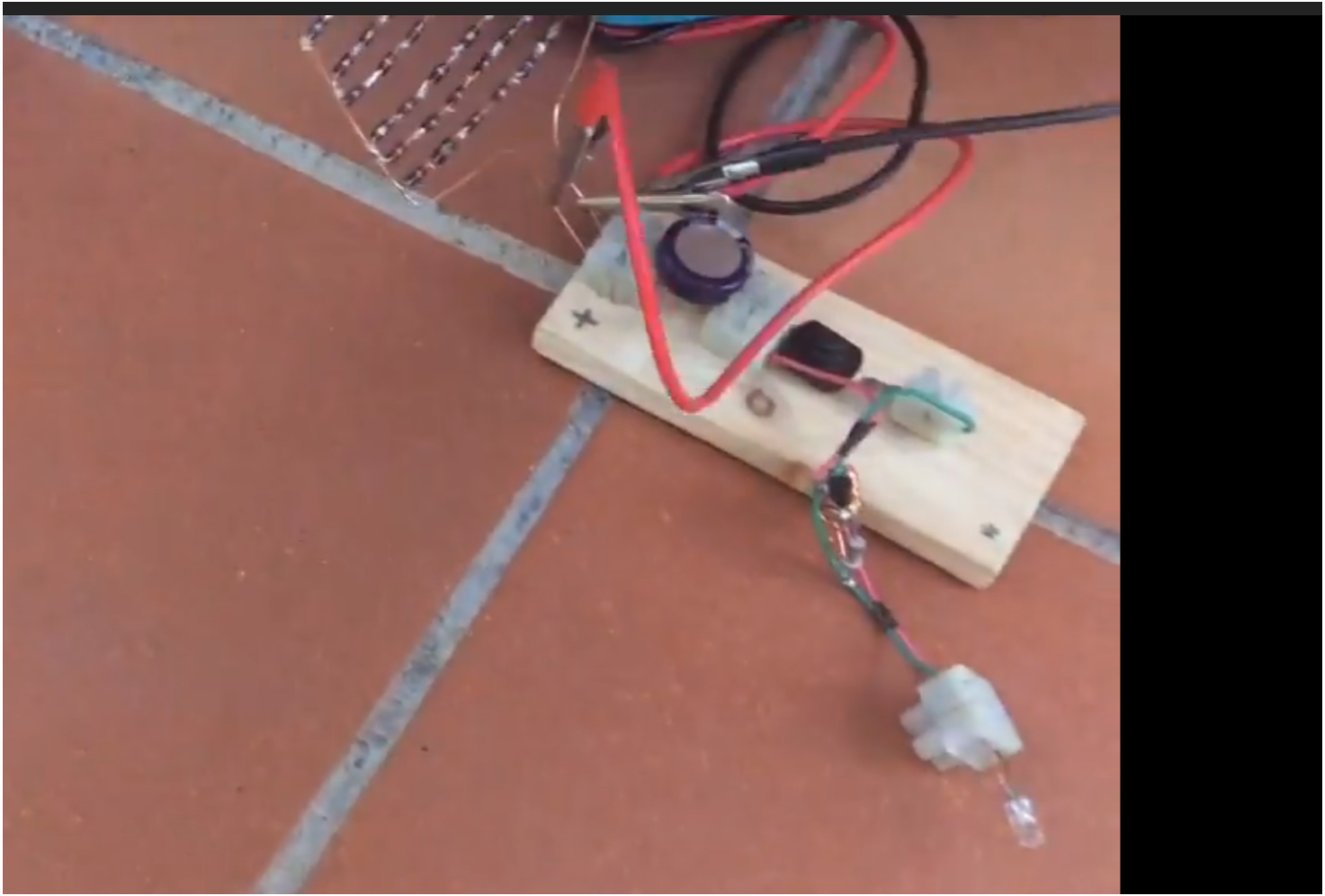
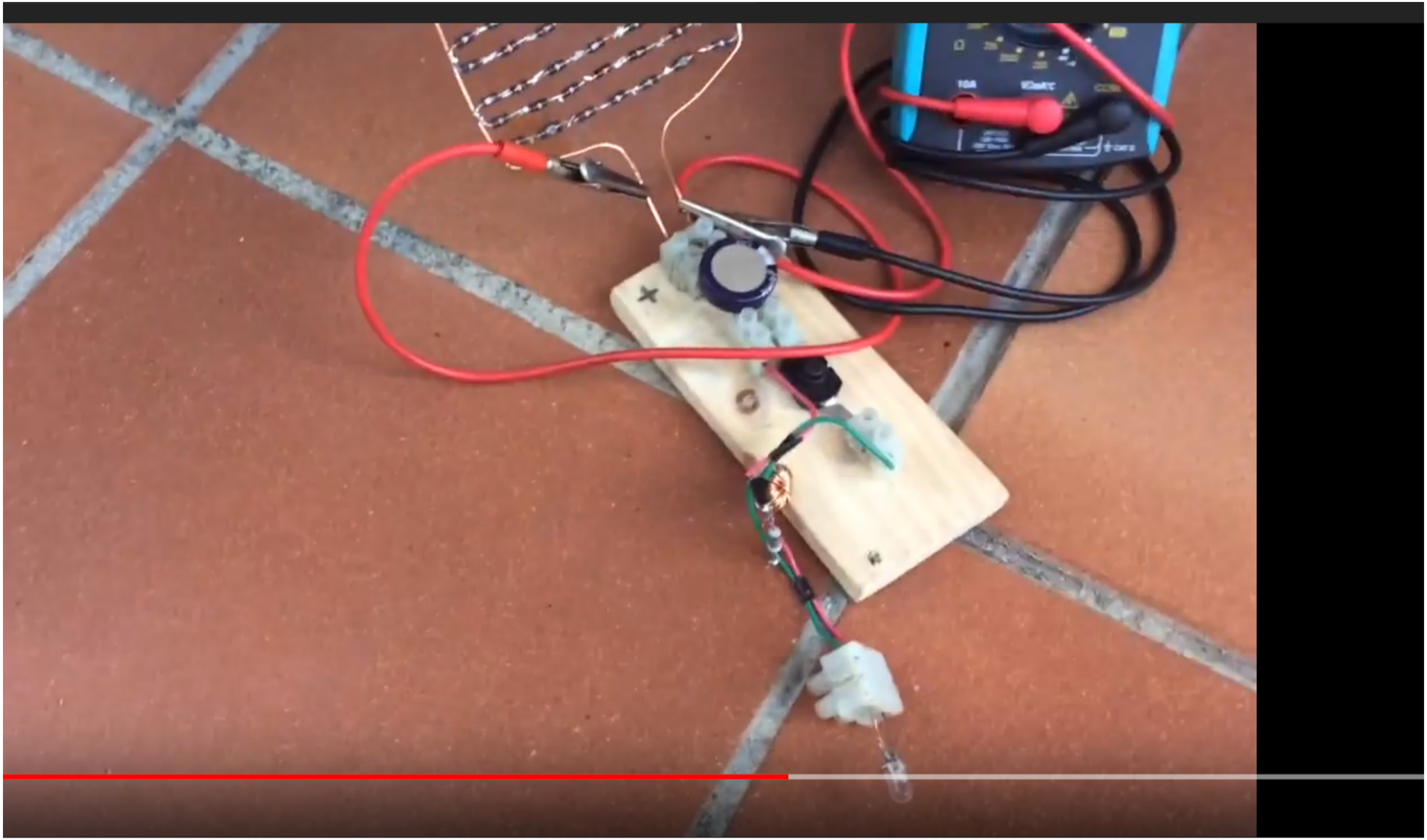
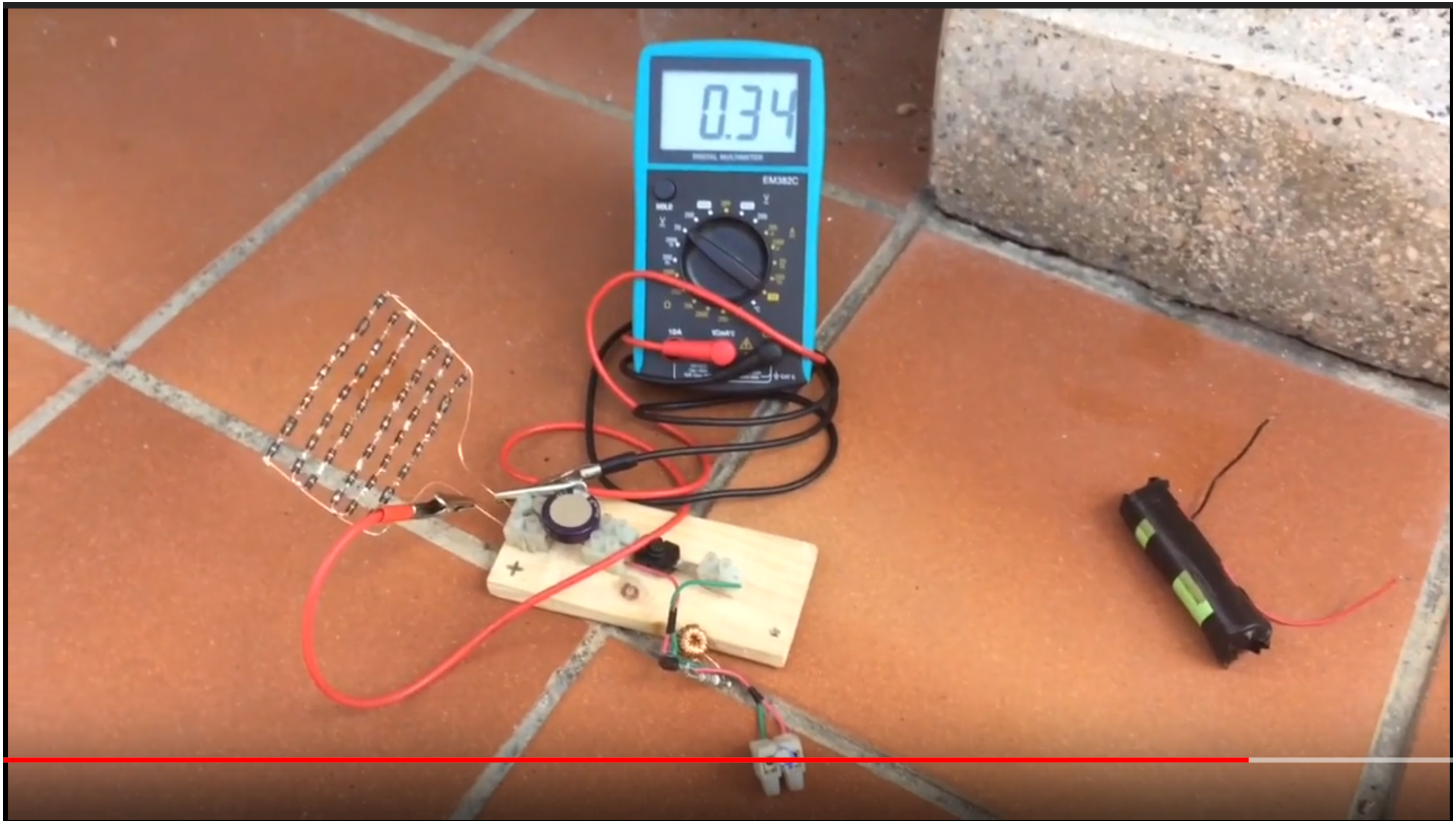
10A



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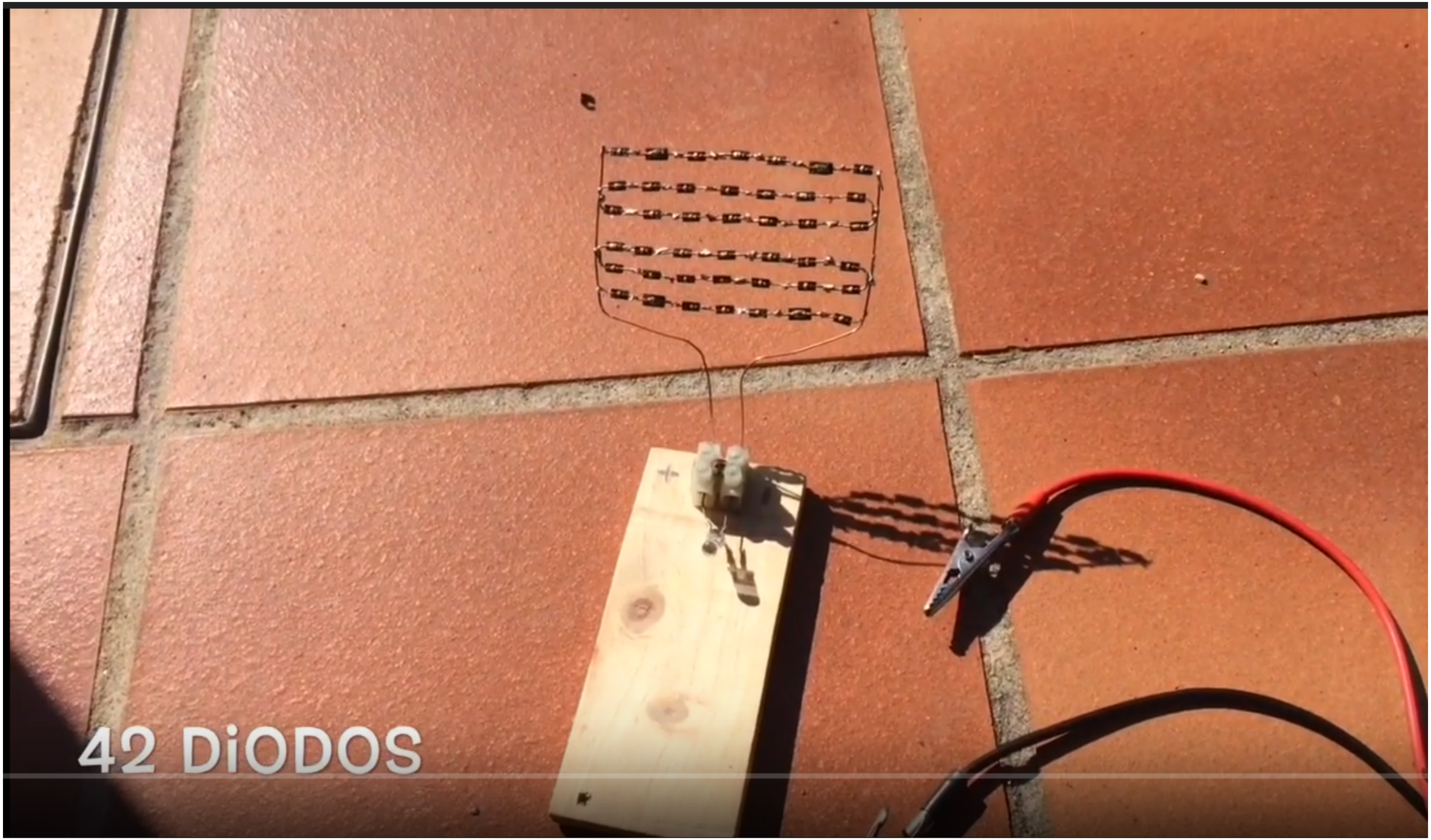
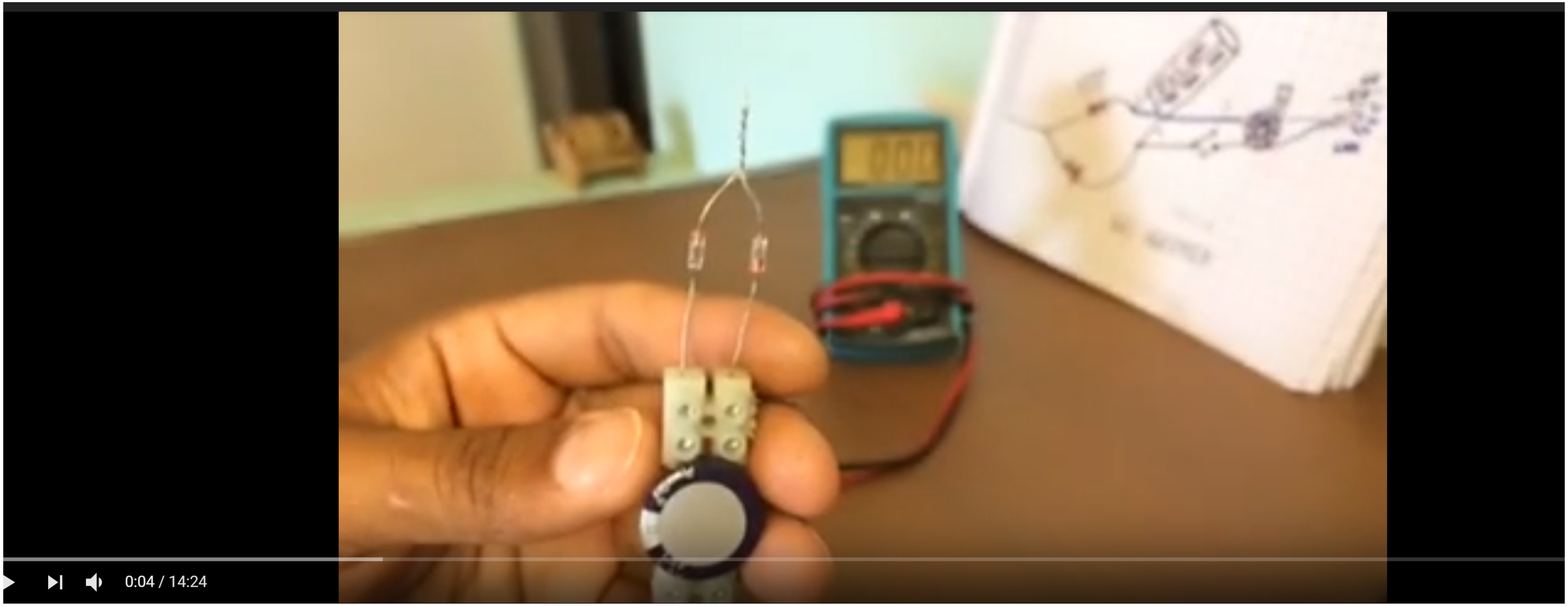

42 DiODOS

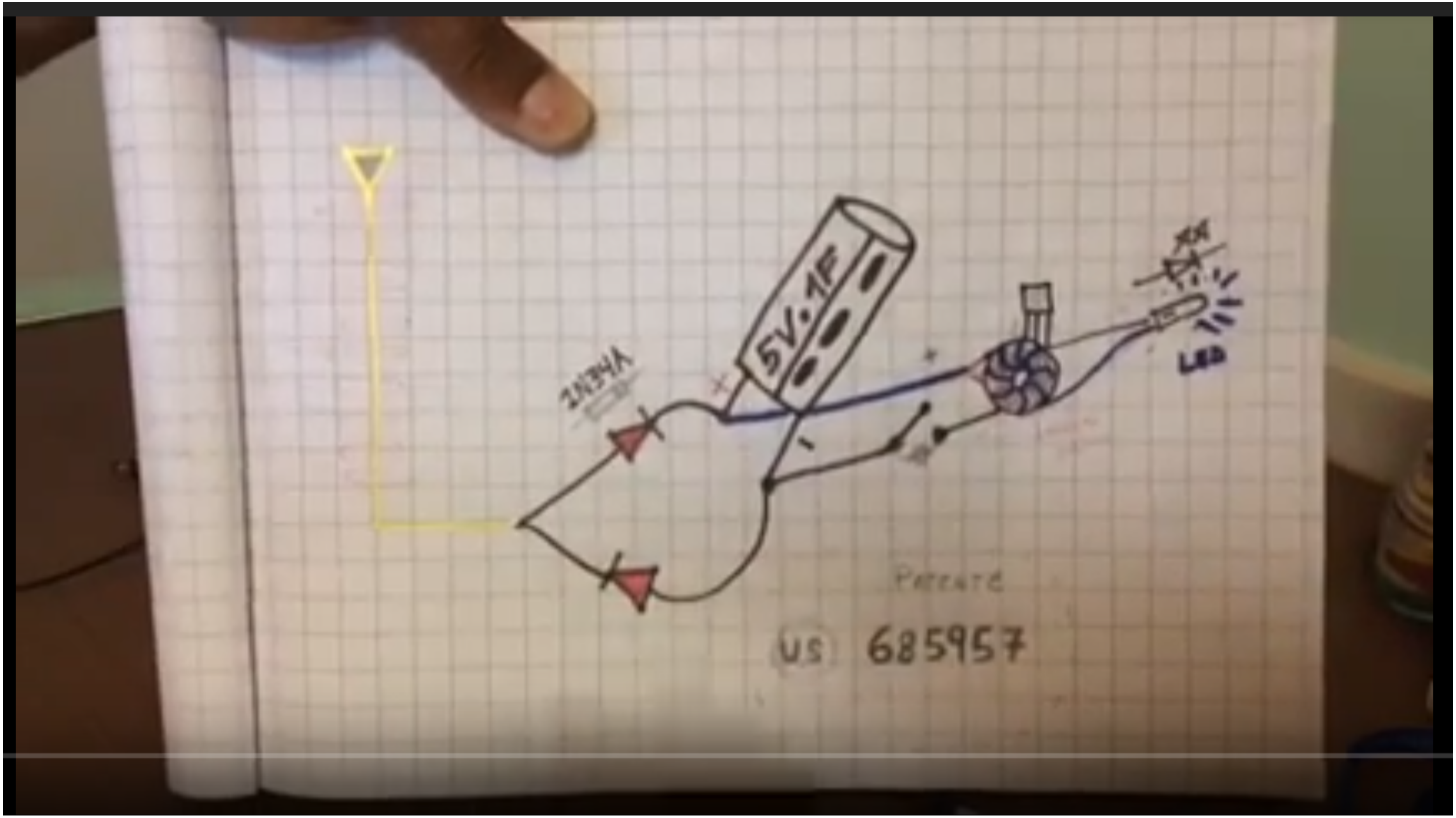


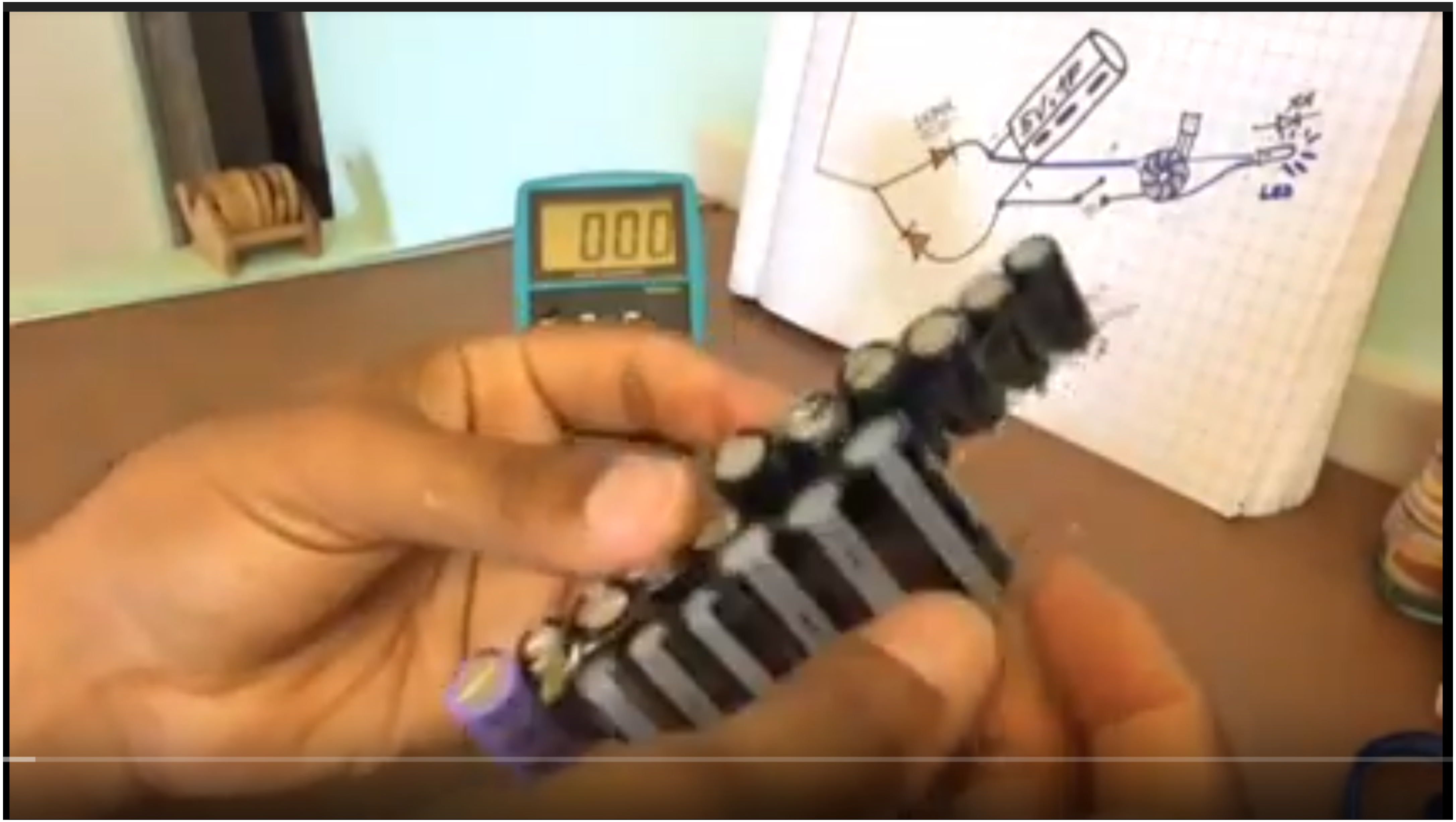
Cargando supercondensador con energía gratis ruido eléctrico

Up next


1.0F
5.5V


1.0F
5.5V


1N34A
5V.1F
LED
Patente
US 685957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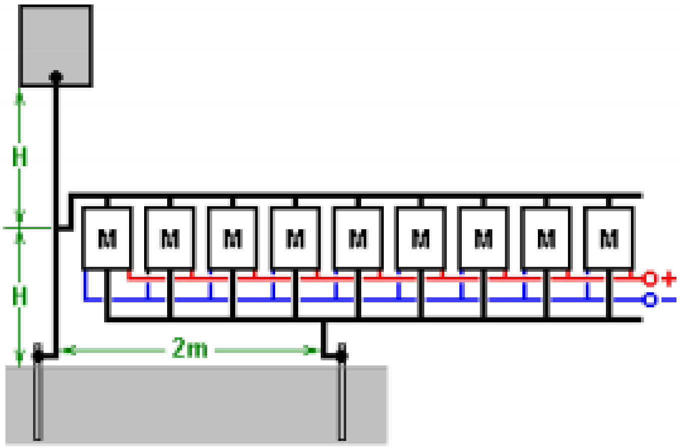
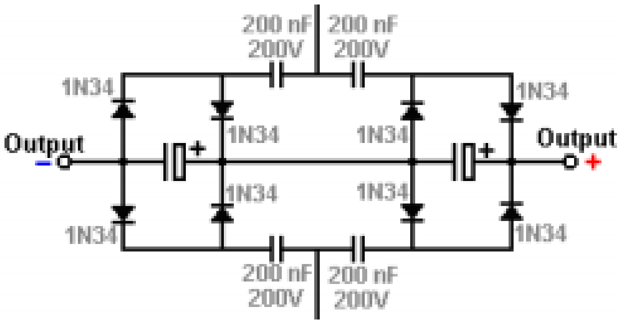
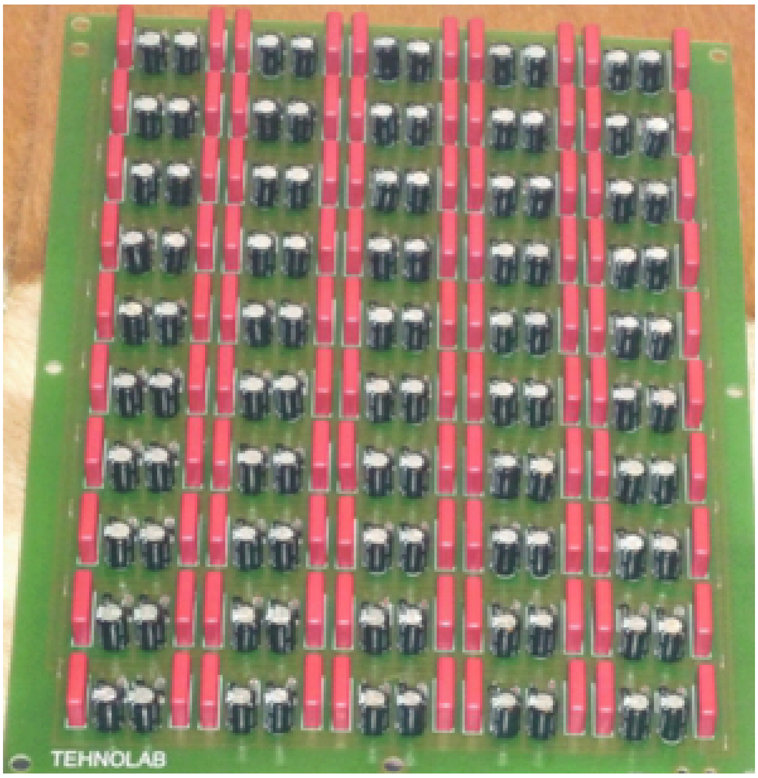
SIEMENS



GERMANIUM DIODES ARE NORMALLY USED AND THE BASIC RECEPTION MODULE CAN BE IMPROVED LIKE THIS :



THIS ARRANGEMENT DOUBLES THE OUTPUT FOR EACH MODULE. DRAGAN PUT 100 OF THE ORIGINAL MODULES TOGETHER ON TWO BOARDS LIKE THIS AND GOT 100 WATTS OUTPUT FROM THEM :



First you need to build the "Tesla Free Energy Circuit". So find a breadboard and follow one of the diagrams above.

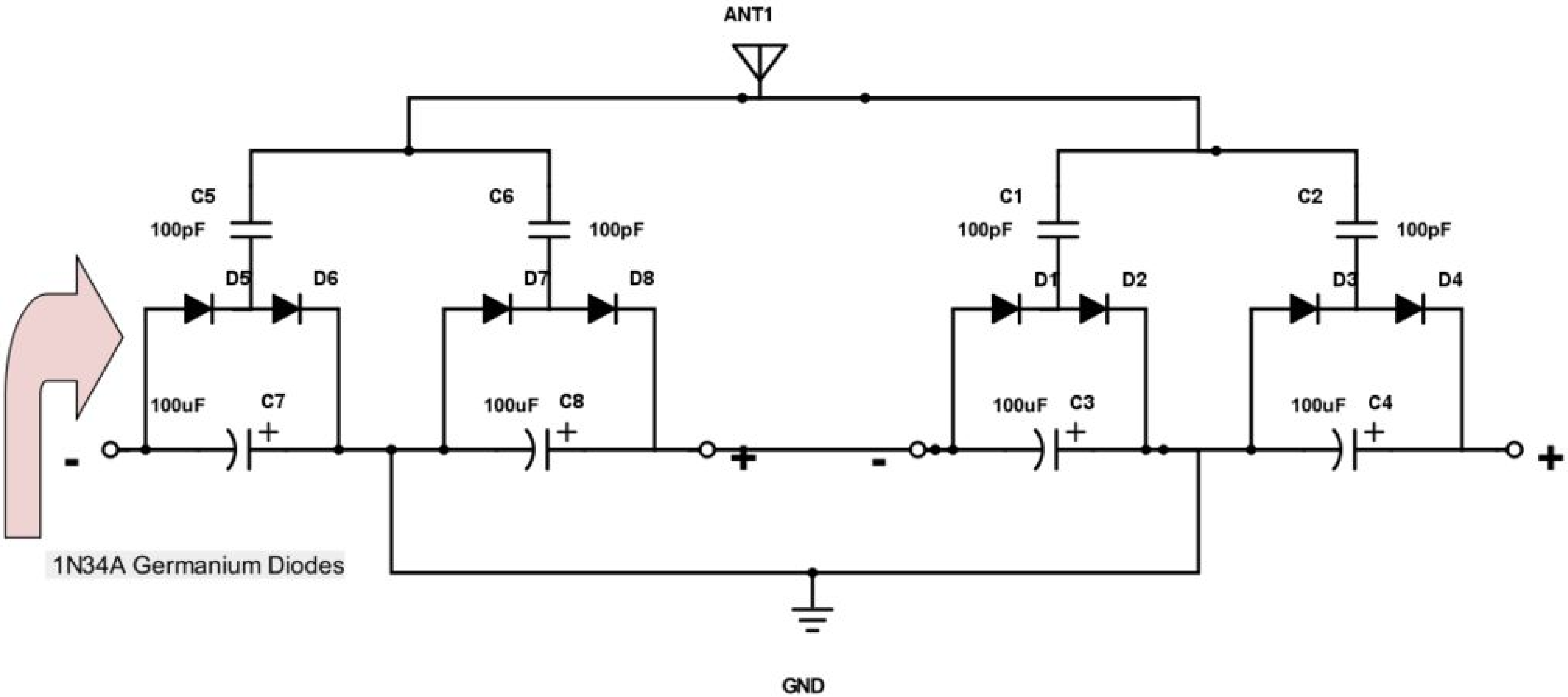
The first diagram shows the basic circuit and the second shows the schematic for two wired in series.

You will need at least the following to build the first circuit:

4 diodes (I used 1N34A Germanium Diodes)

2 100pF ceramic capacitors

2 100uF electrolytic capacitors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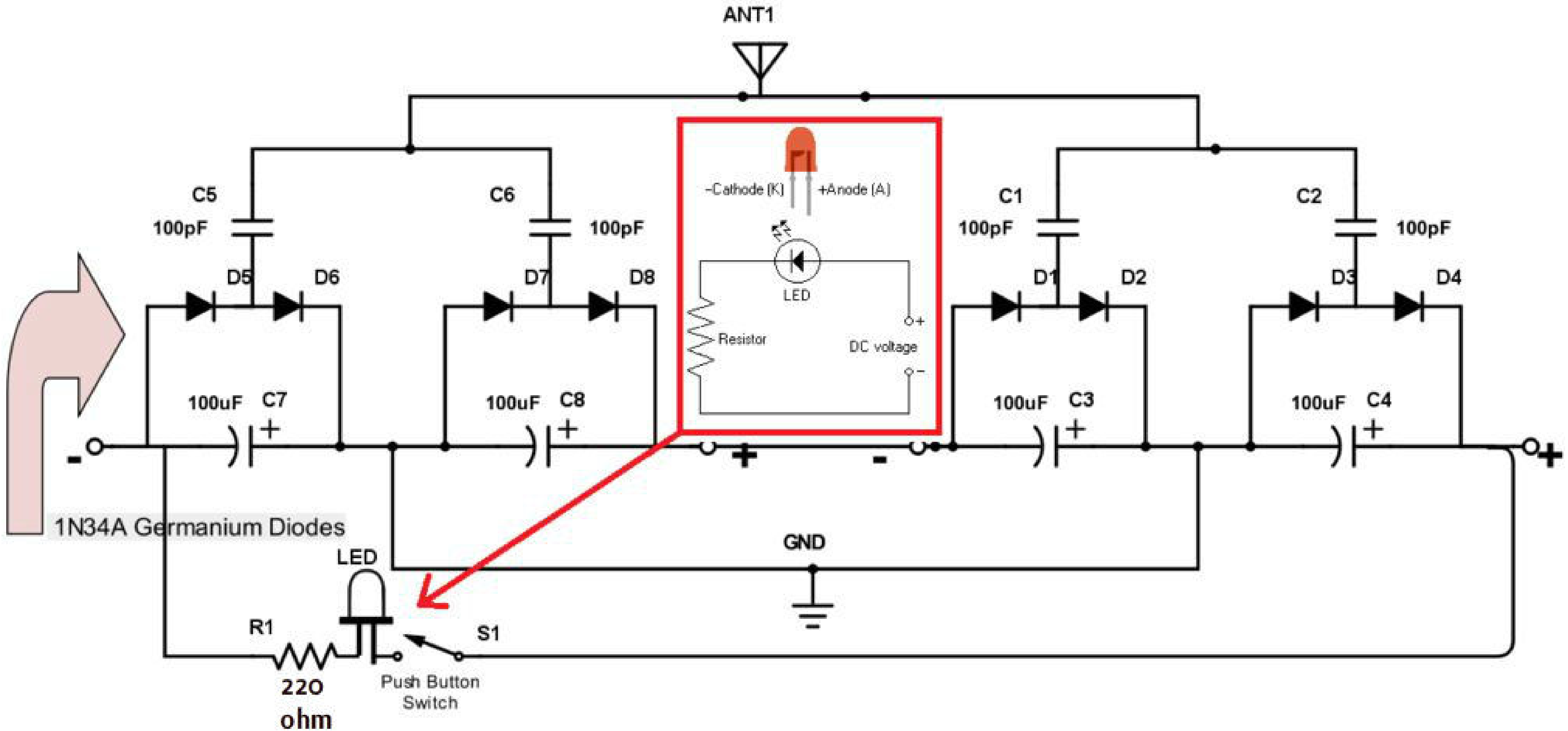
100pF
C6
100pF
C1
100pF
C2
100pF
D5
D6
D7
D8
D1
D2
D3
D4
100uF
C7
100uF
C8
100uF
C3
100uF
C4
-
+
-
+
1N34A Germanium Diodes
GND



ANT1
C5
100pF
C6
100pF
C1
100pF
C2
100pF
D5
D6
D7
D8
D1
D2
D3
D4
-Cathode (K)
+Anode (A)
LED
Resistor
DC voltage
100uF
C7
100uF
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C4
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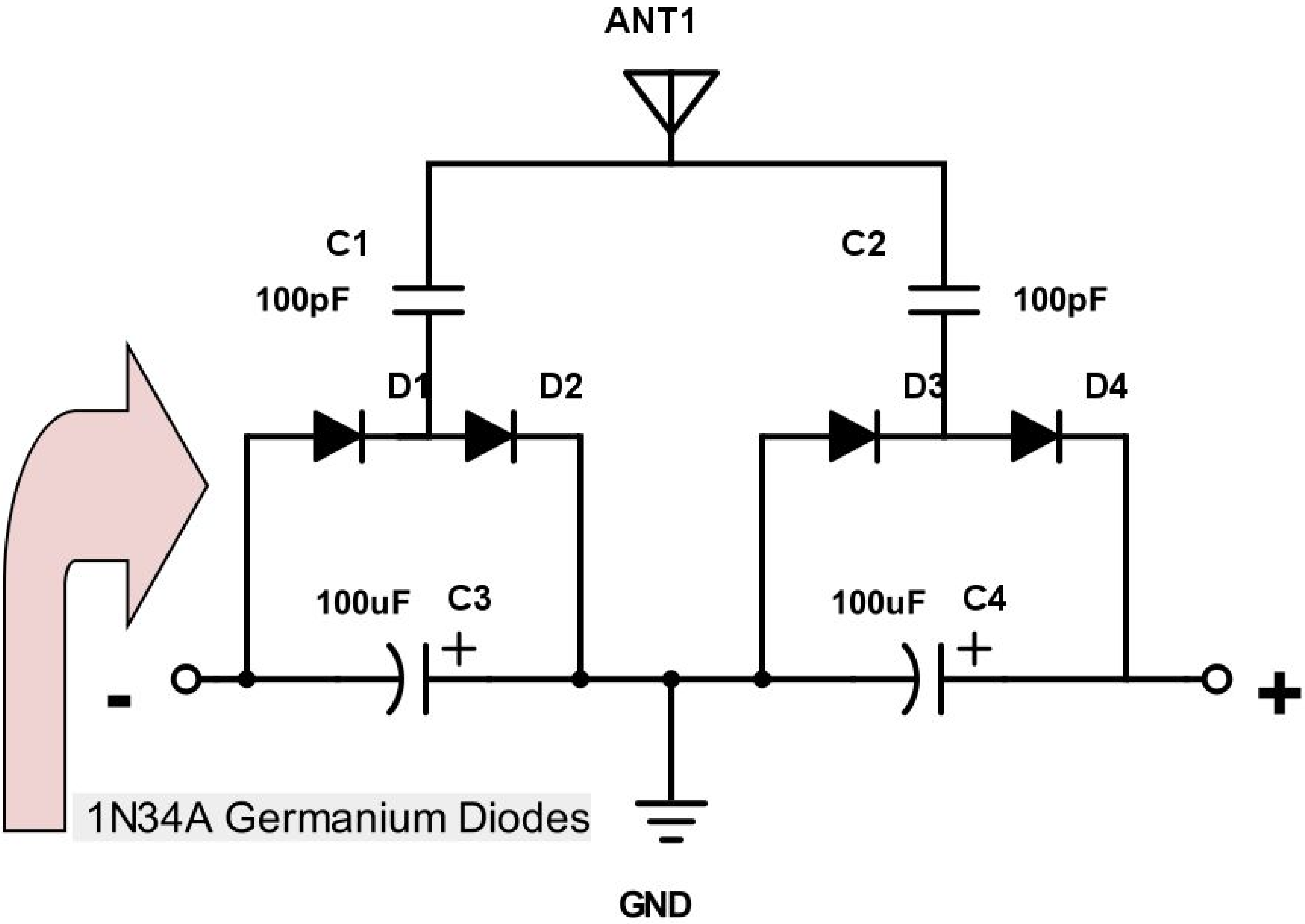
GND
LED
R1
220 ohm
S1
Push Button Switch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100pF
C2
100pF
D1
D2
D3
D4
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C3
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C4
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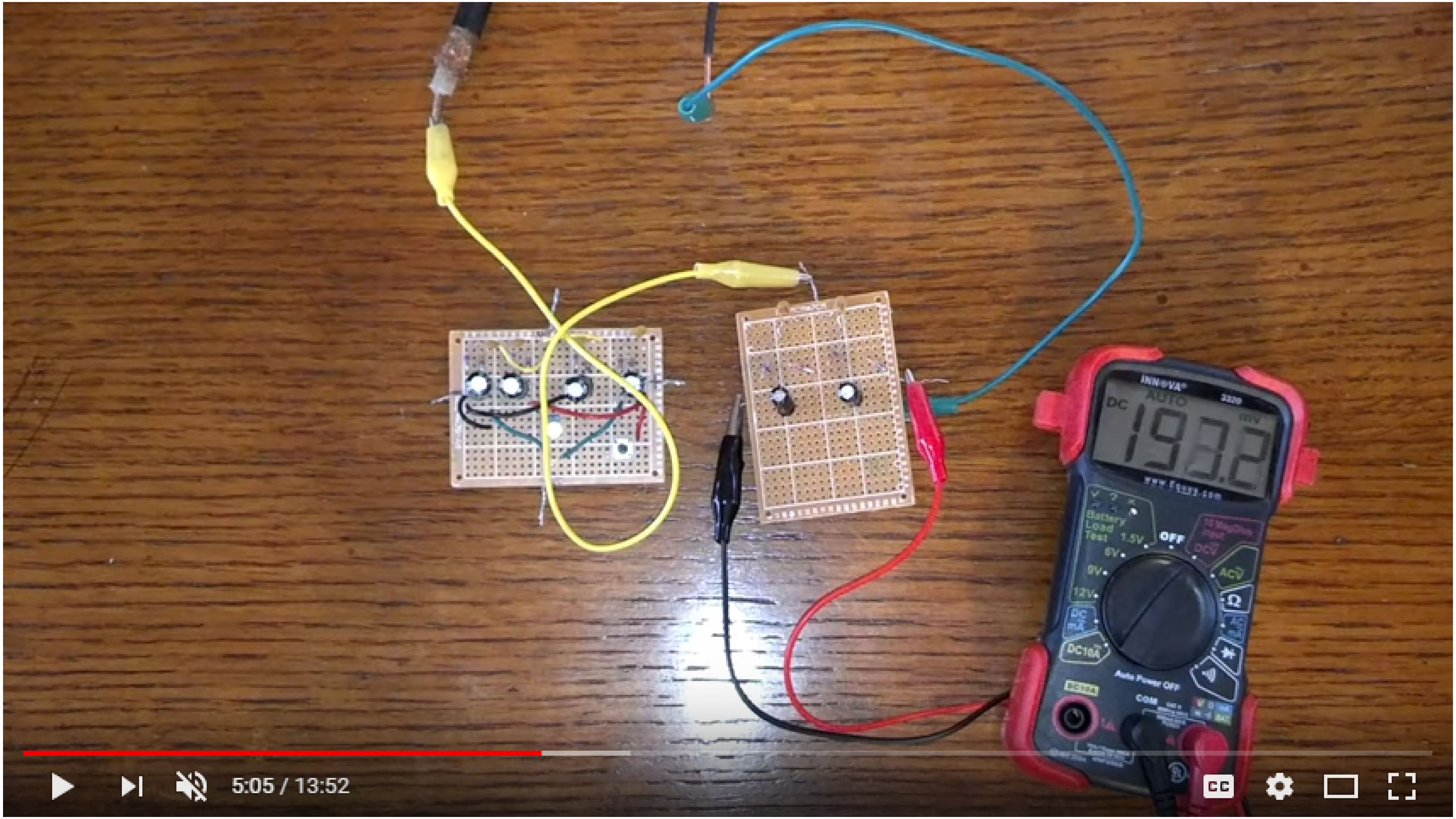
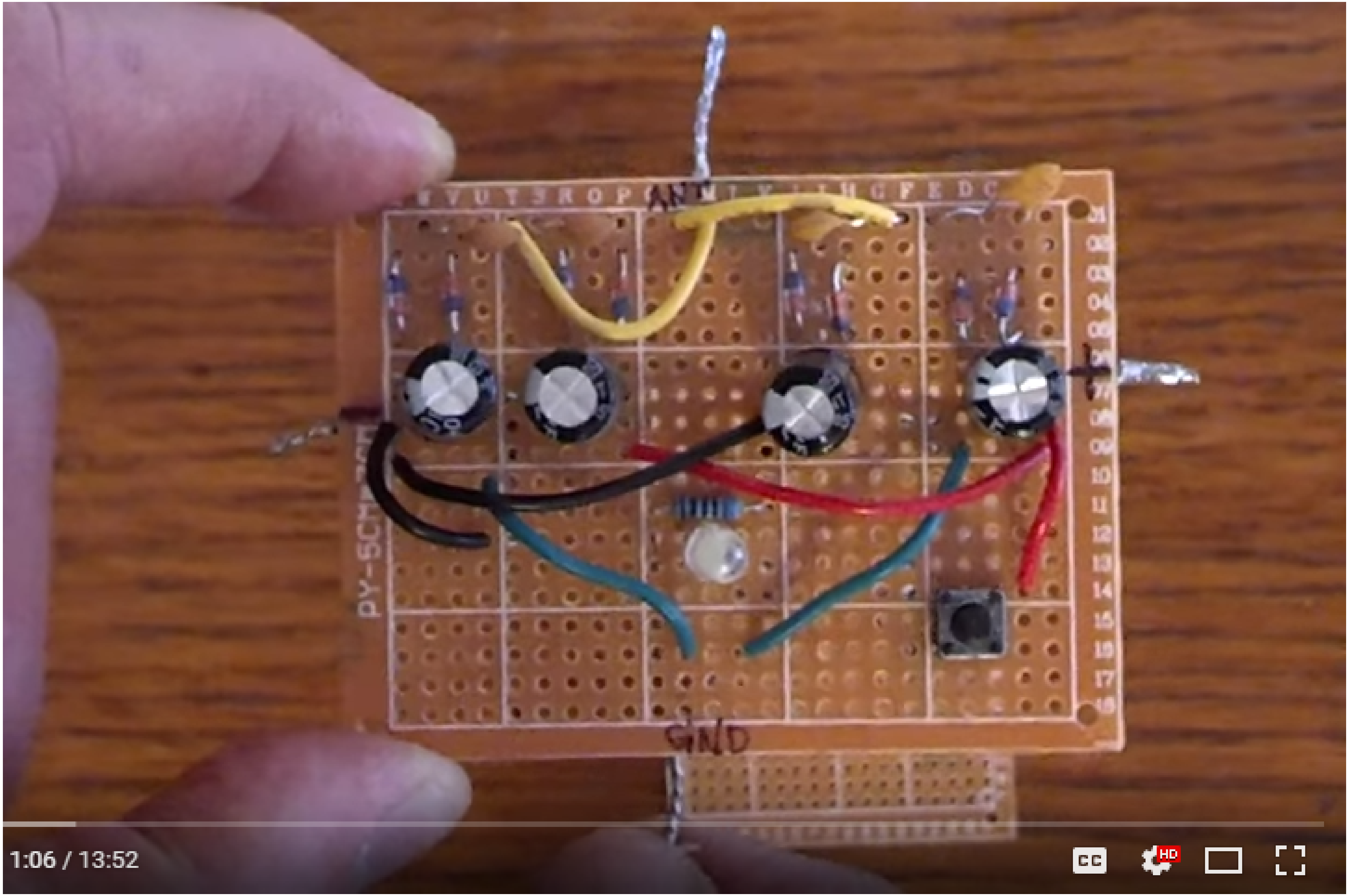
-
+
1N34A Germanium Diodes
GND



Tesla Free Energy Air Circuit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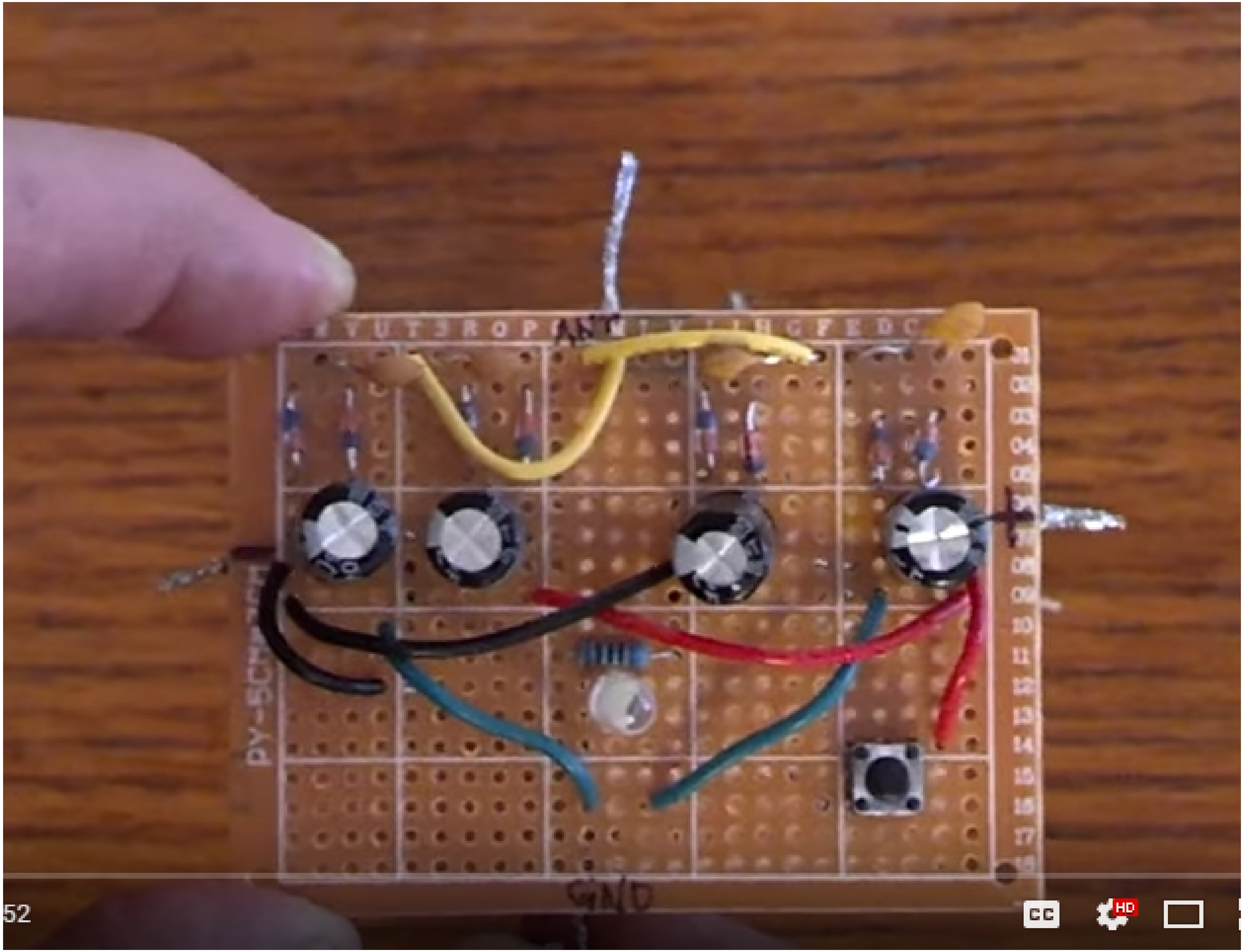

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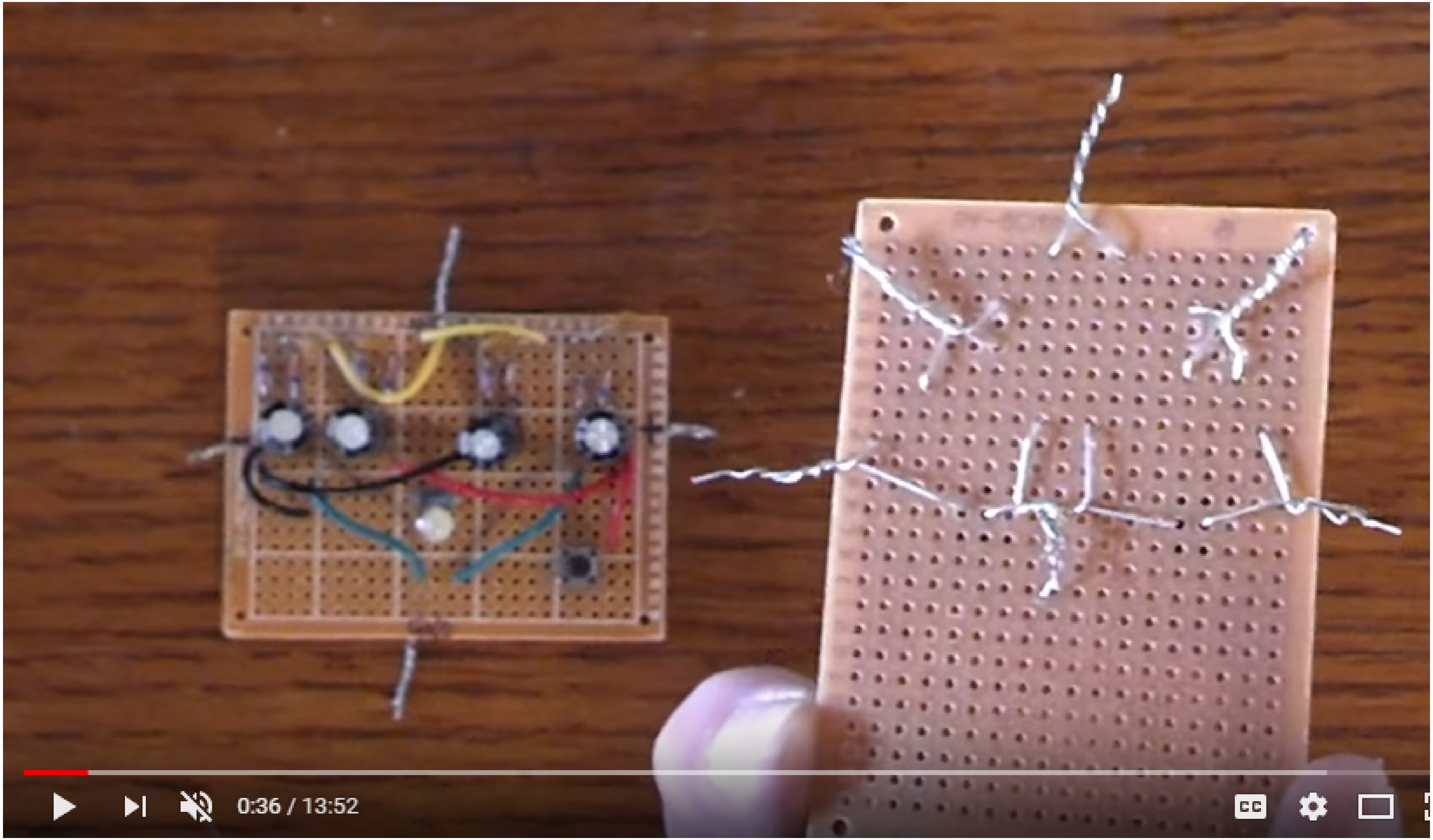
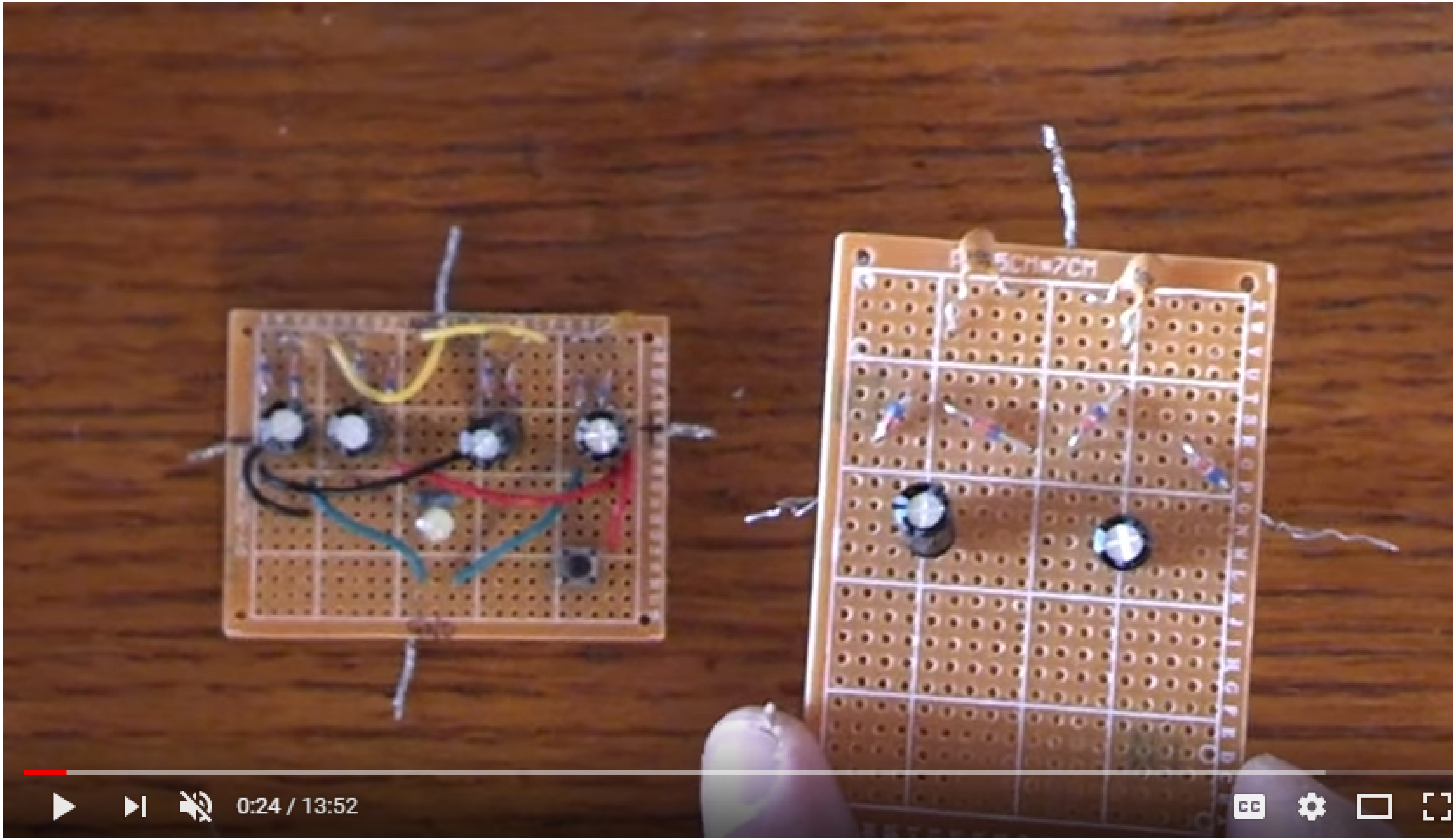
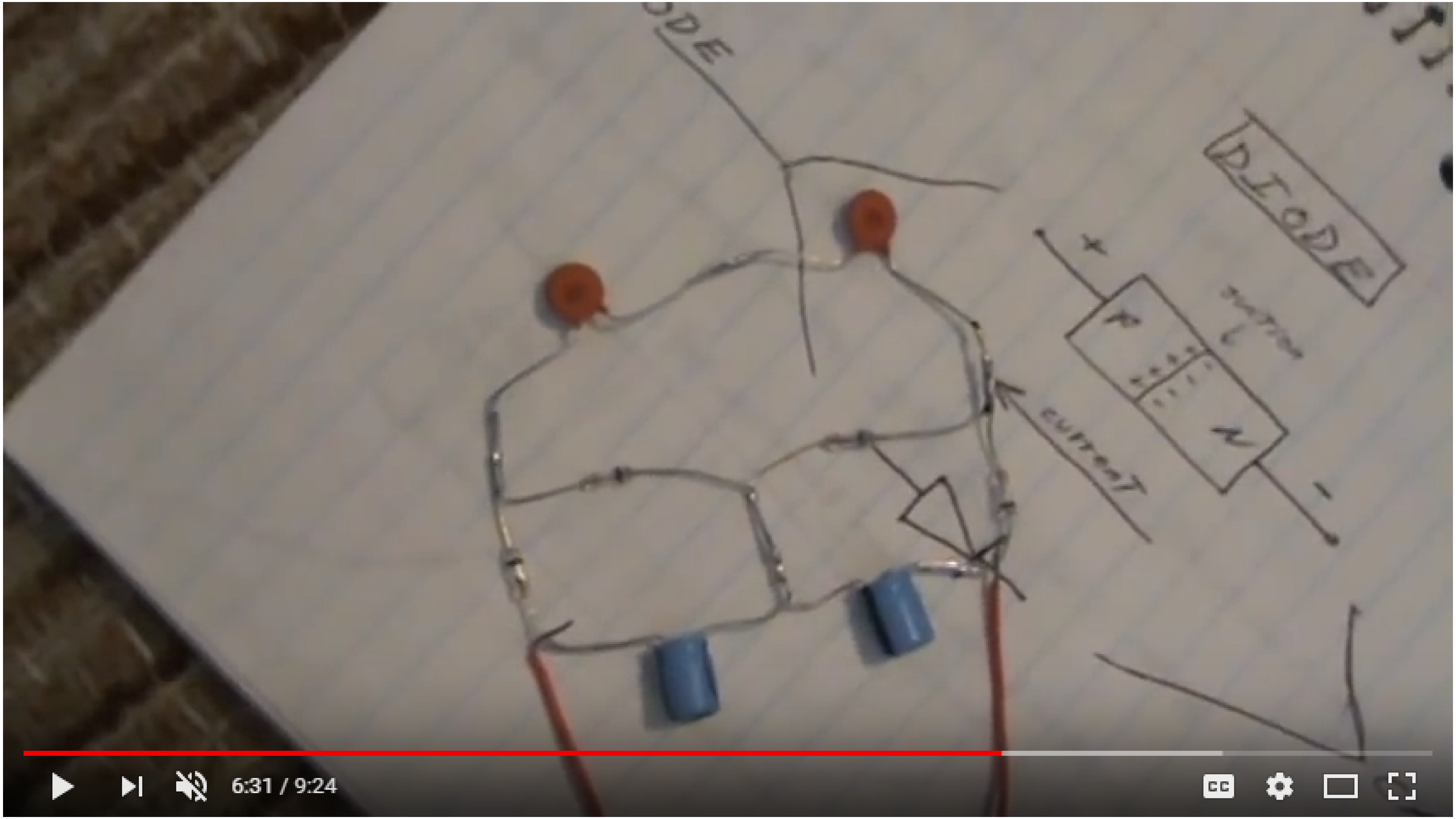


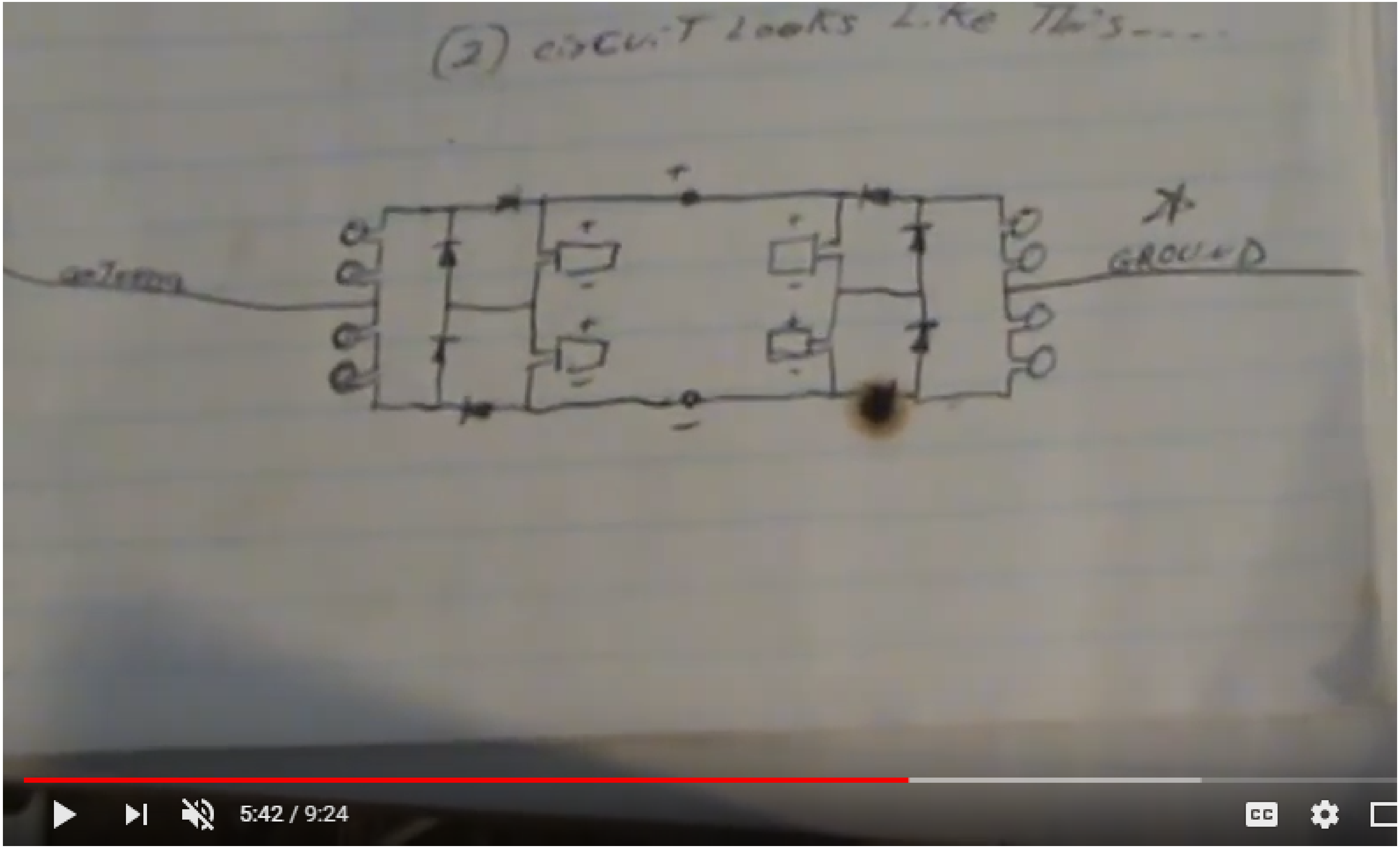
Tesla Free Energy Air Circuit



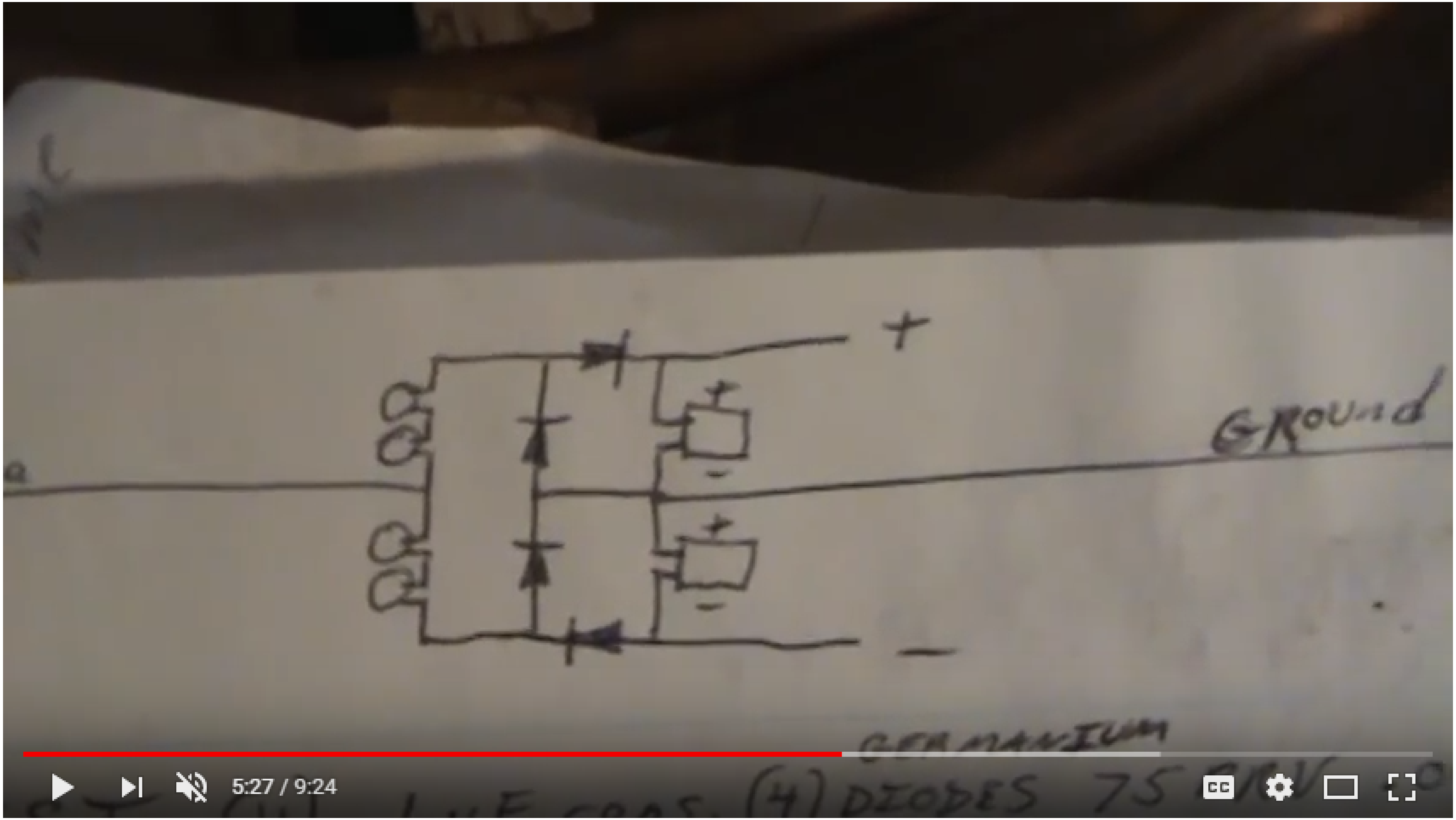
Tesla Free Energy Air Circuit



FREE ENERGY CIRCUIT- HOW TO, PART 2/3

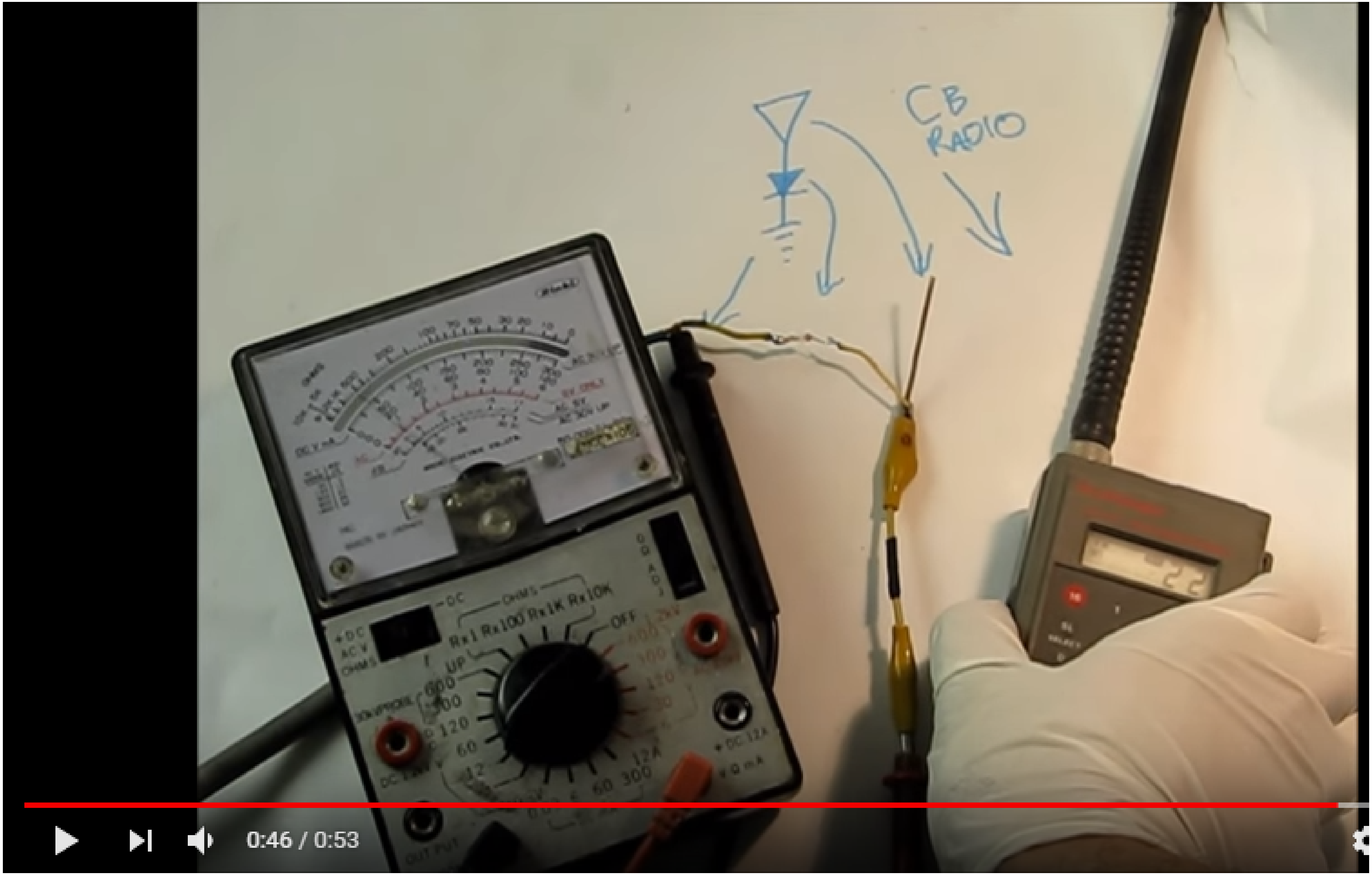


FREE ENERGY CIRCUIT- HOW TO, PART 2/3



FREE ENERGY CIRCUIT- HOW TO, PART 2/3

FREE ENERGY CIRCUIT- HOW TO, PART 2/3



DIY Wireless Power - Part 2: Simple Wireless Power Transmission! (CB)

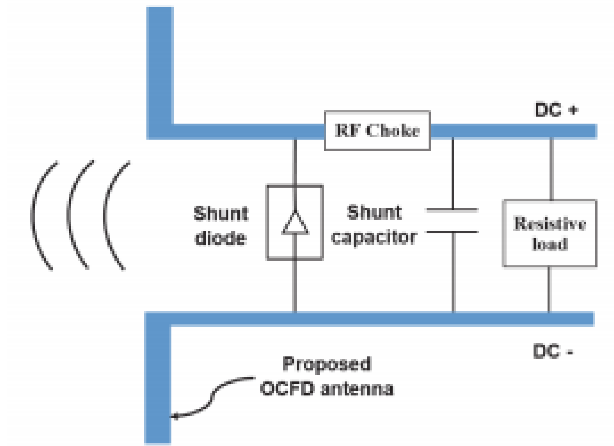


Fig. 9. Configuration of a single shunt diode (Class F) rectifier with a dipole antenna.

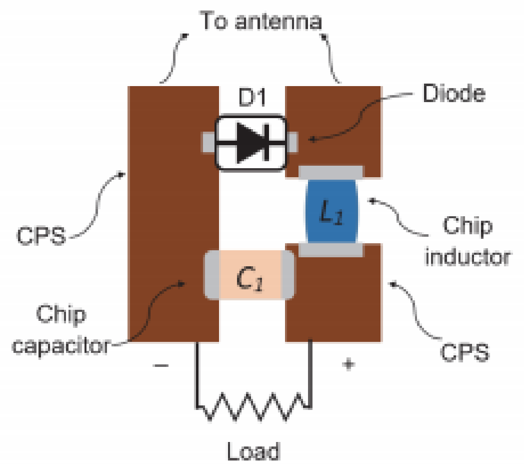


Fig. 10. Configuration of the proposed rectifier on coplanar striplines (CPS).

TABLE III
CIRCUIT COMPONENTS USED IN THE DESIGN

Component name	Nominal Value	Part number and supplier
D1	Schottky diode	SMS7630-079LF, Skyworks
L1	47 nH chip inductor	0603HP47N, Coilcraft
C1	100 nF chip capacitor	GRM188R71H104JA93D, Murata

antenna have a radius of 50 mm and a circumference angle of

respectively. While the imaginary part of the proposed OCFD is around 0 Ω at resonant frequencies 0.6 GHz, 1.2 GHz and 2.4 GHz, which are f_0, $2f_0$, and $4f_0$ respectively. These results have demonstrated that the simulated results agree with the OCFD theory as discussed in Section III–A. Furthermore, the imaginary part of the impedance of the antenna over the resonant frequency band from 1.4 to 2 GHz turns from negative values (for the reference antenna) to positive values (for the proposed antenna). As shown in Fig. 7(b), the value of the imaginary part of the proposed antenna impedance varies between 0 and 300 Ω over the desired frequency band. This feature could help the proposed antenna to produce a better conjugate matching with the rectifier, since the imaginary part of the impedance of the rectifier normally varies between -700 and 0 Ω as we discussed earlier. The simulated 3D radiation patterns of the proposed antenna at the frequencies of interest are depicted in Fig. 8. The 2D polar plots of antenna patterns in *E-plane* and *H-plane* are shown as well. Here we have only showed the directivity (maximum gain) of the antenna (without taking the mismatch loss into account). From Fig. 8, it can be seen that the antenna has symmetrical patterns about YOZ plane with a maximum directivity of 1.8 dBi at 0.9 GHz, 3.5 dBi at 1.8 GHz and 3.3 dBi at 2.4 GHz. The antenna is more directive towards the long arm direction at 1.8 GHz and 2.4 GHz with the half-power beam-widths (HPBW) of around 174° and 185° respectively. The HPBW is about 96° at 0.9 GHz.

Therefore, the proposed broadband OCFD antenna has obtained high impedance over a wide frequency range. The proposed design is just an example to illustrate the proposed new method. The details of the dipole could be modified according to the frequency of interest.

IV. RECTENNA INTEGRATION

A. Rectifier Configuration

The proposed high impedance OCFD antenna may directly conjugate match with the input impedance of a rectifier over a wide frequency band. The rectifier should only consist of few circuit components for rectification, DC storage and output. A single shunt diode rectifier is selected due to its very simple structure and high conversion efficiency [33]. The configuration of the single shunt diode rectifier with a dipole

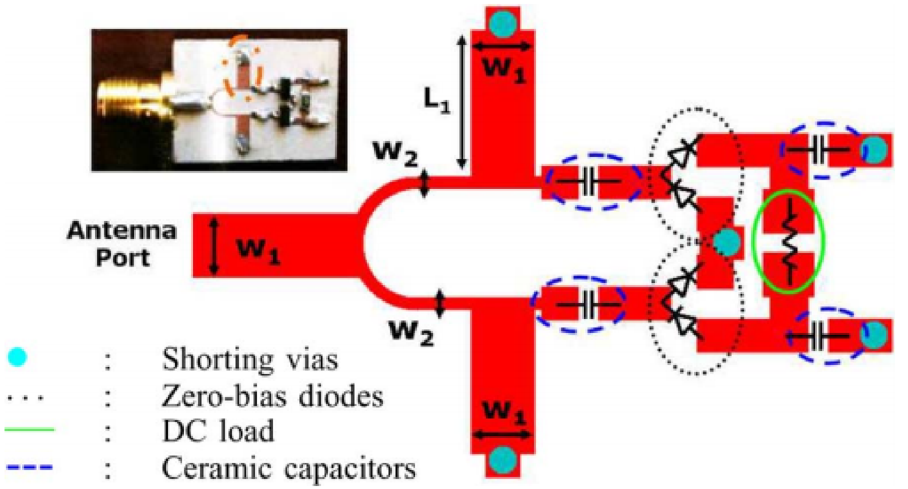
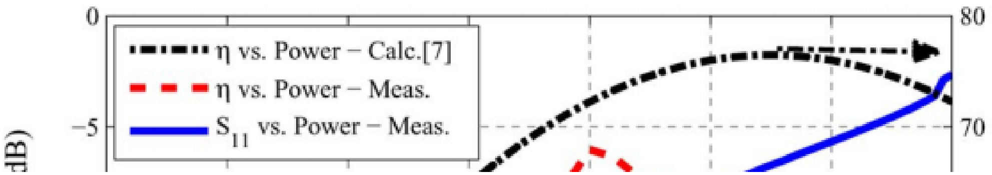


Fig. 3. Layout of the rectifier prototype, printed on RO3206. $w_1 = 72$ mil, $w_2 = 15$ mil, and $L_1 = 171$ mil. Fabricated sample is shown in top left, and the impedance matching stub is encircled.



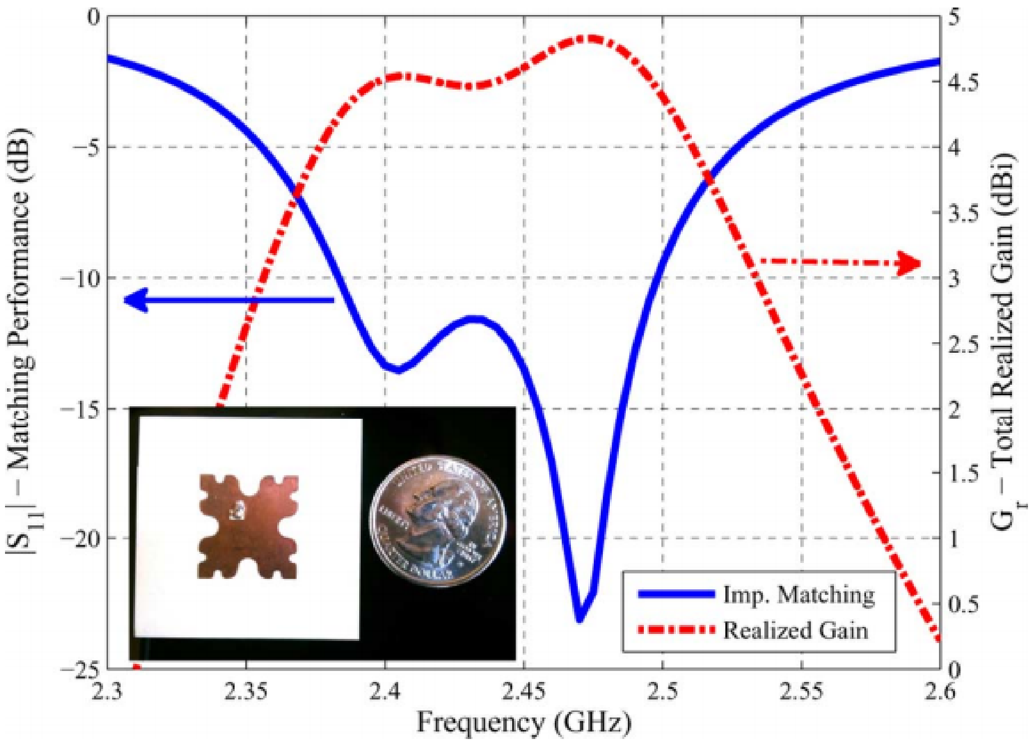


Fig. 5. Measured $|S_{11}|$ performance and total realized gain (at boresight) of the proposed antenna. Fabricated sample is shown in bottom left.

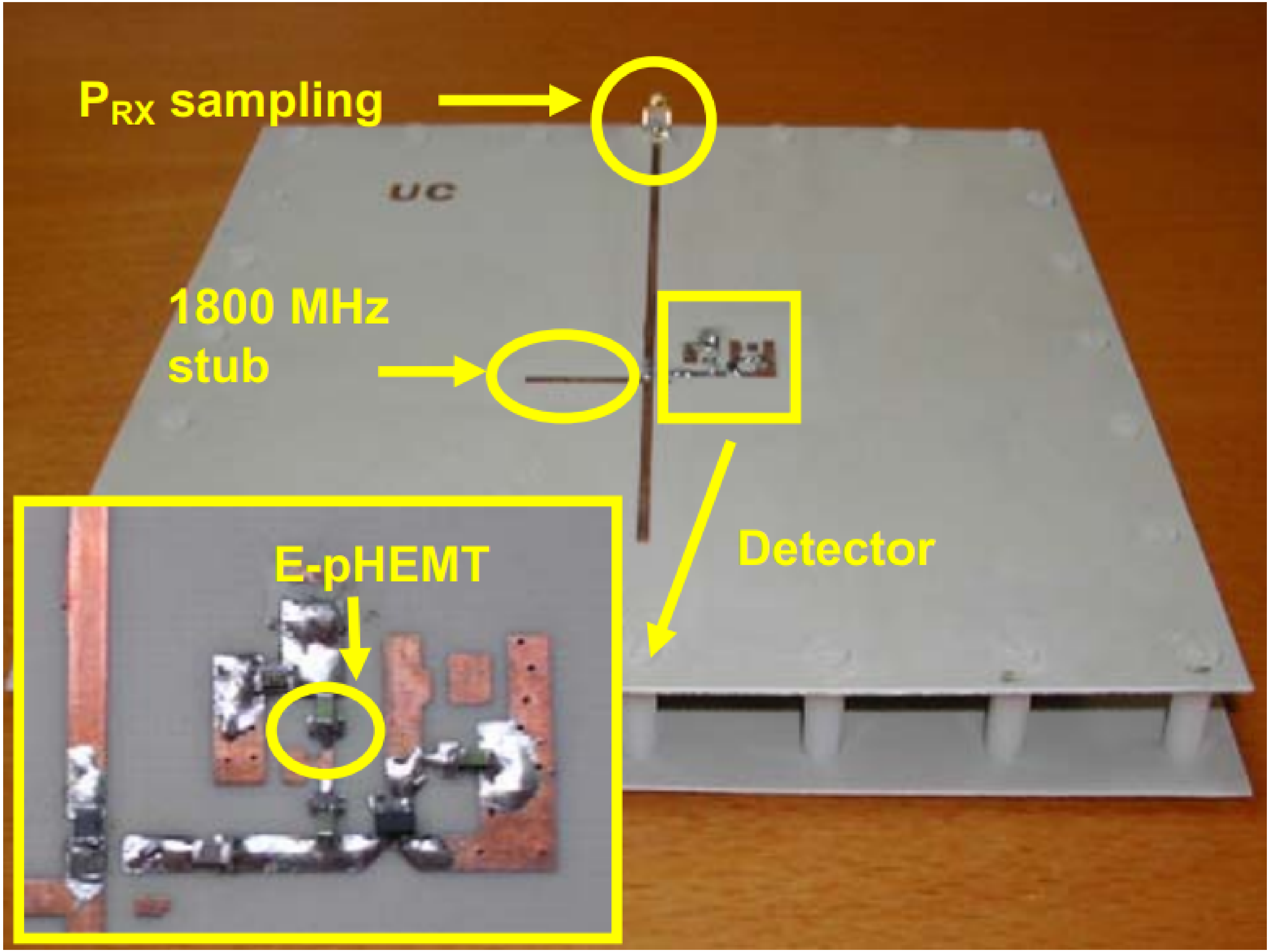


Fig. 6. Photograph of the E-pHEMT based rectenna.

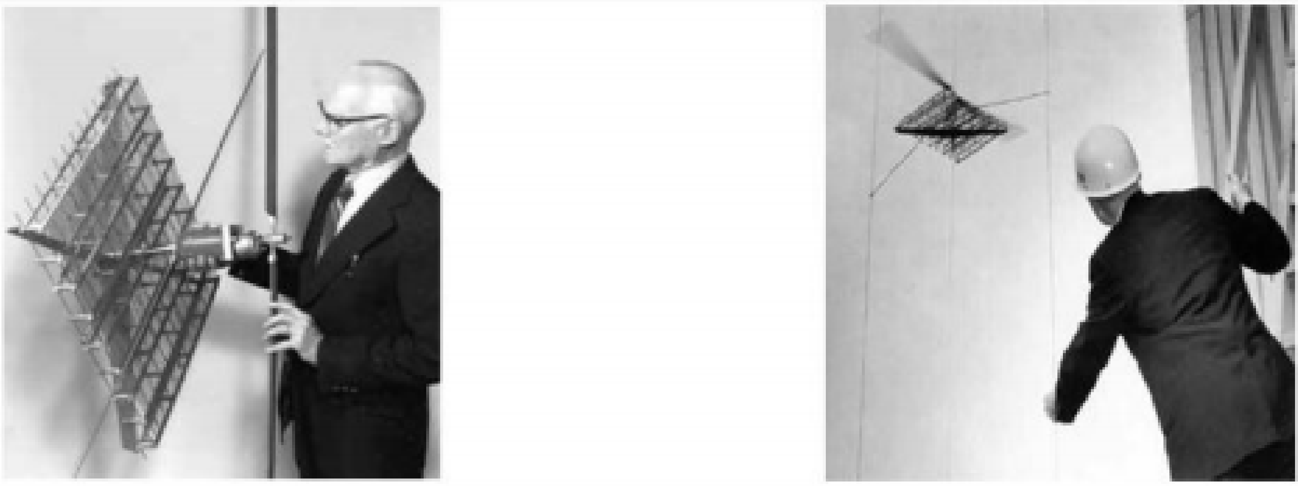


Figure 2.1-1: William C. Brown demonstrating the First rectenna powered vehicle [12].

Since single element antenna is limited in power harvesting, normally it generates fraction of watts, Brown assembled 28 half-wave dipoles that resulted in 40 to 70 percent conversion efficiency to be used in aerospace applications with no fuel source. Brown arranged rectenna elements as a four arm bridge network, with different configurations for instance, parallel, series, and parallel-series using a whisker element semi conductor rectifying junction connected to a non directional recieving antenna. Brown used a microwave source to feed a horn antenna via a transmission line in order to form the microwave beam as shown in figure 2.1-2 [13].

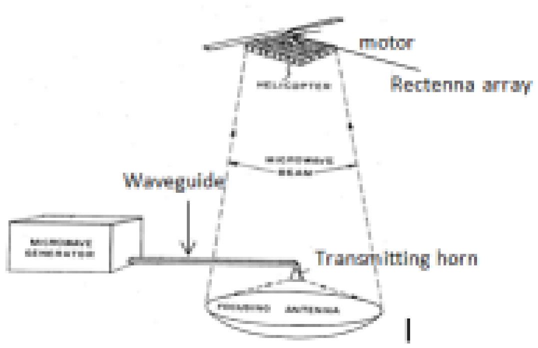


Figure 2.1-2: Brown's space vehicle rectenna [13].

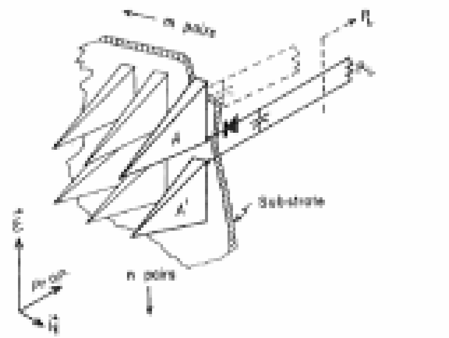
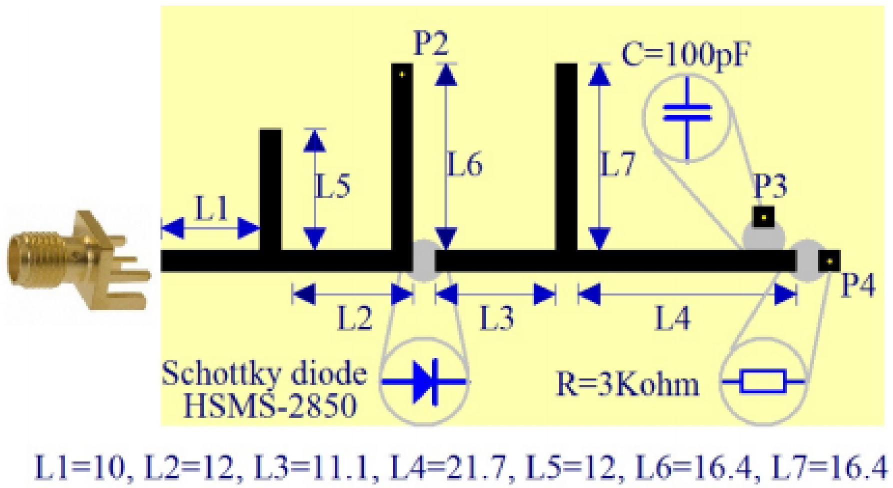
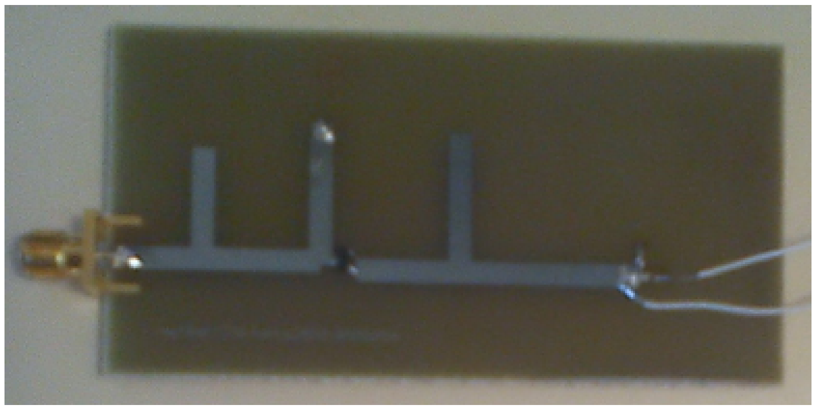


Figure 2.1-3: Bailey's conical array of electromagnetic wave energy collectors [14].

The rectifying circuit with Schottky diode HSMS-2850 is shown in Fig. 3.40. The matching circuit is constructed by a single stub *L5* and a microstrip line *L2*. A quarter-wavelength short stub *L6* is located next to the diode. It contributes to a DC loop (Via-hole *P2* - Schottky diode - Load - Via-hole *P4* - Ground plane). The low pass filter consists of *L3*, *L4*, and an open stub *L7*. This filter rejects harmonic signals and improves the rectification process.



(a) Prototype (dimensions in millimeters)



(b) Photo

FIGURE 3.40: Configuration of a rectifying circuit with HSMS-2850

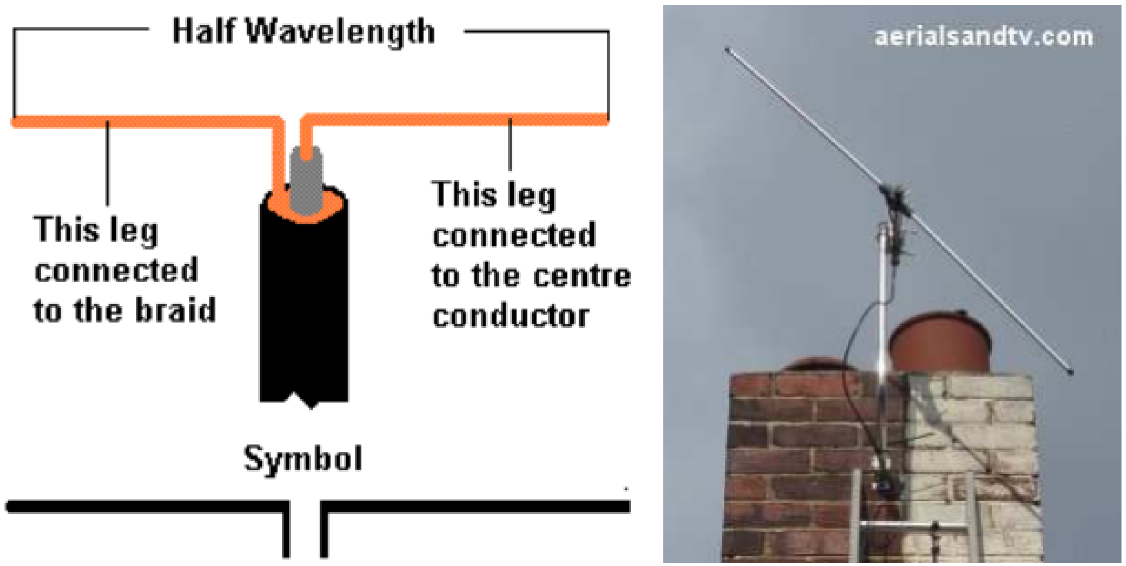
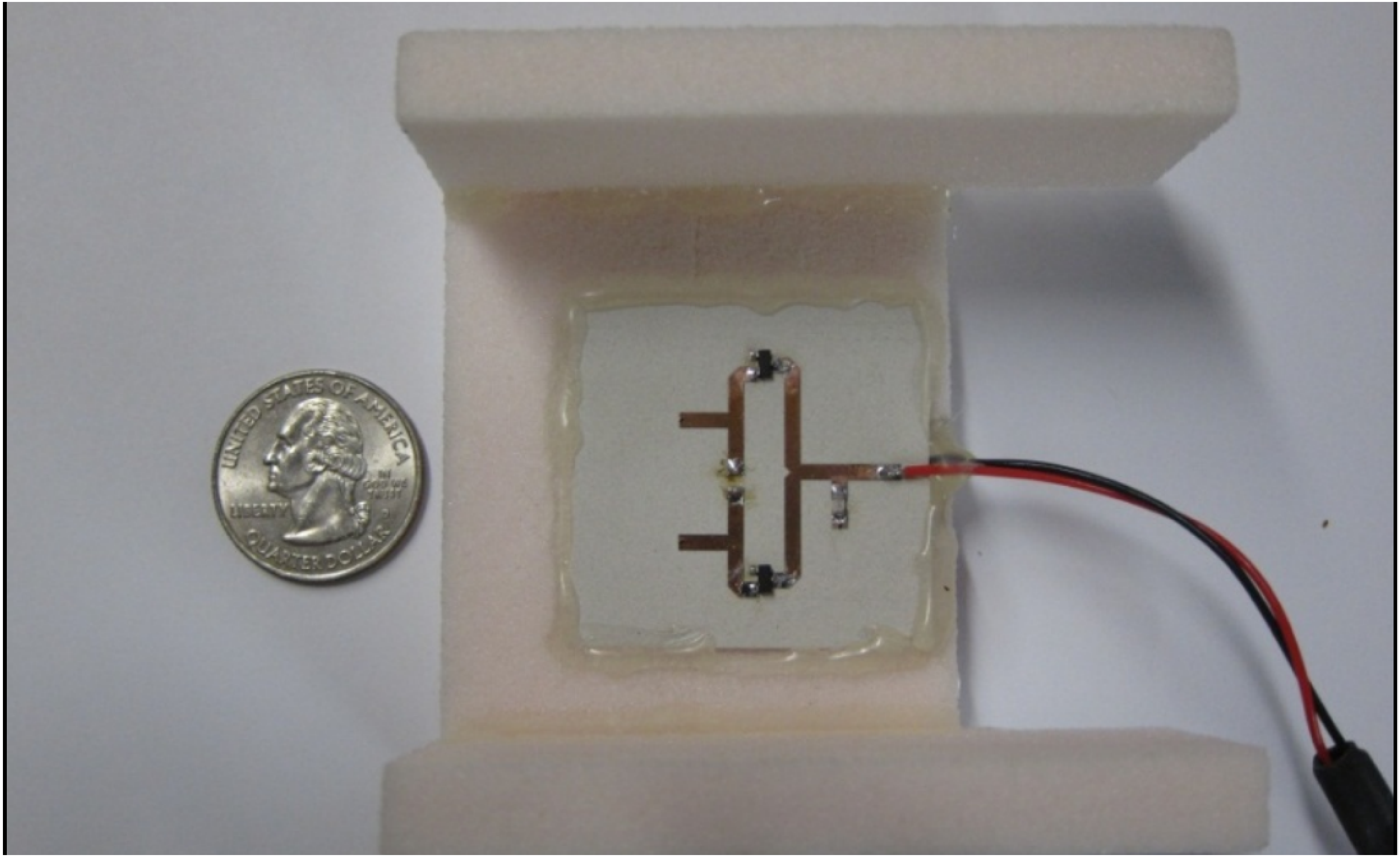
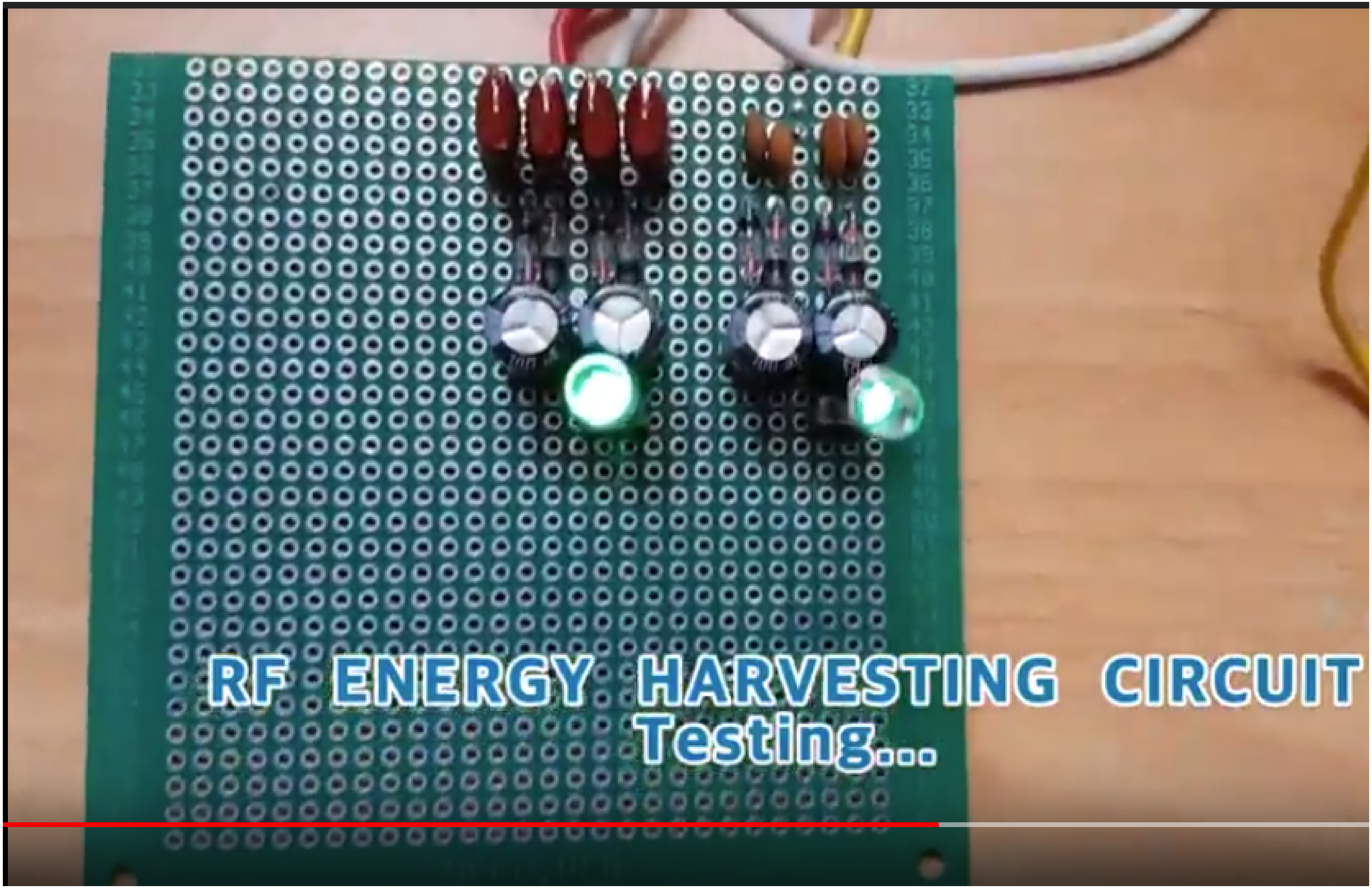
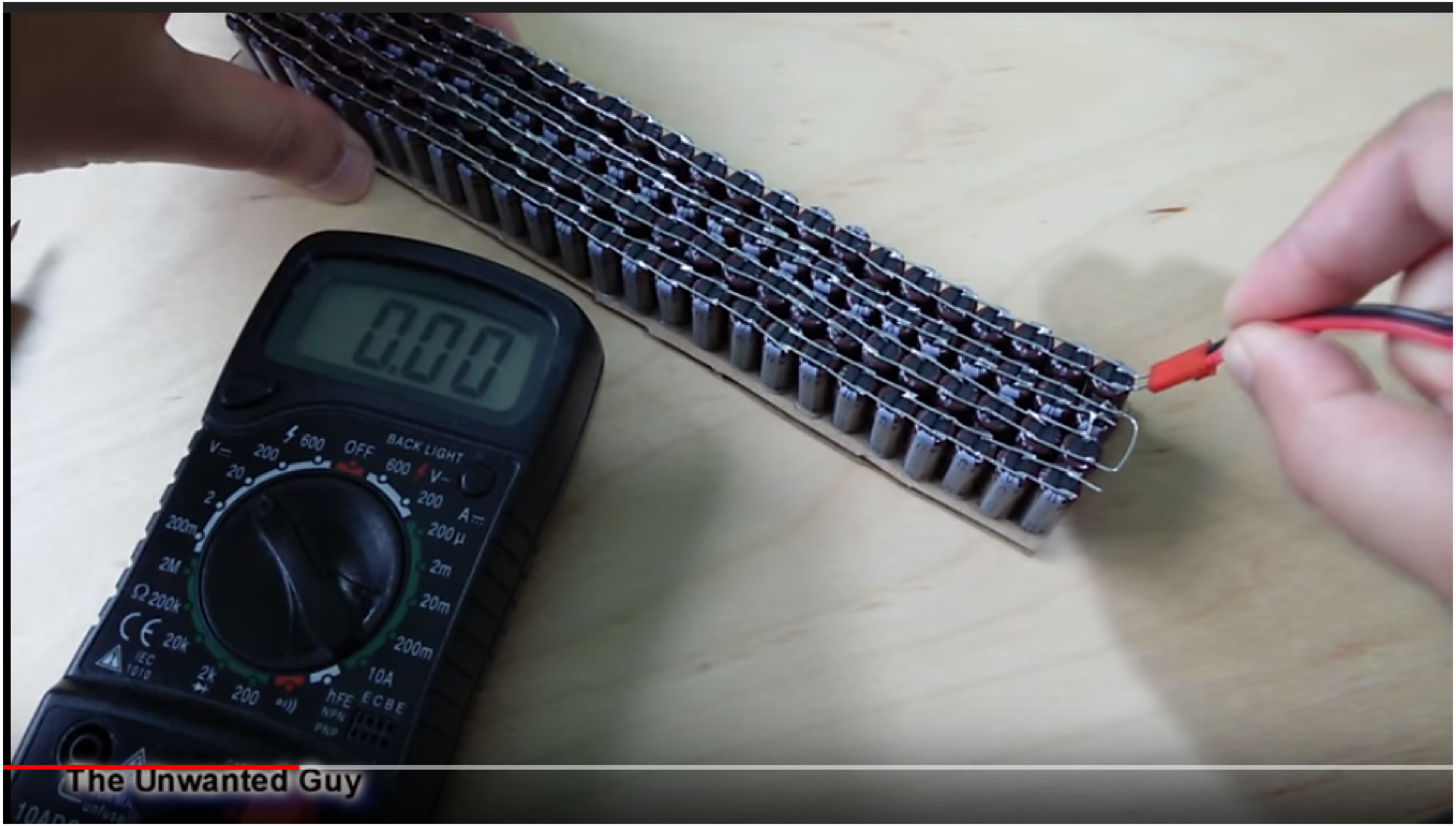


Fig. 8. Half-wave dipole. *Left side:* Antenna structure. *Right side:* Typical deployment.


UNITED STATES OF AMERICA
LIBERTY
QUARTER DOLLAR


RF ENERGY HARVESTING CIRCUIT
Testing...


0.00
OFF
BACK LIGHT
The Unwanted Guy


AnyTime
S M T W T F S
START/STOP
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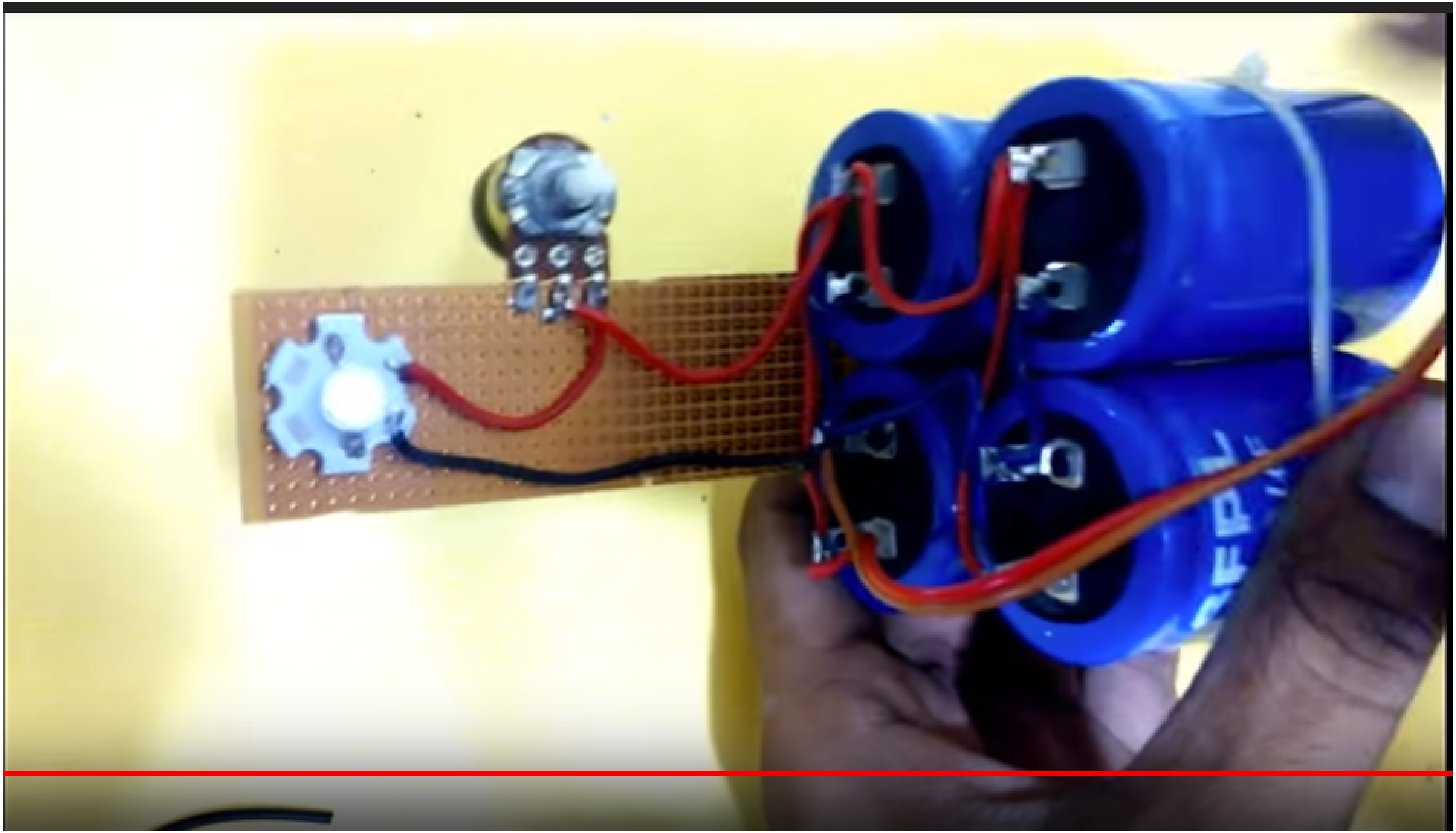
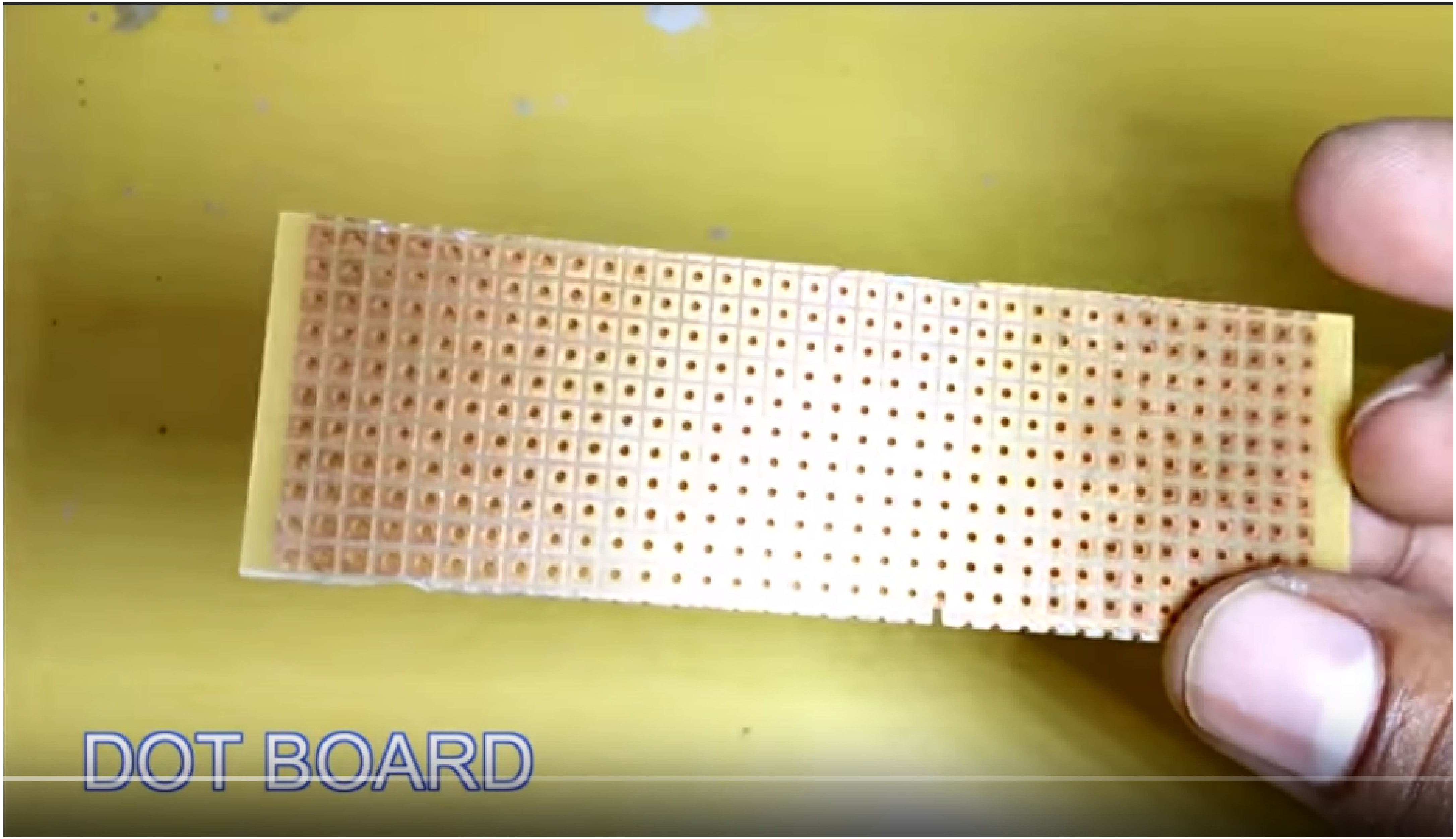
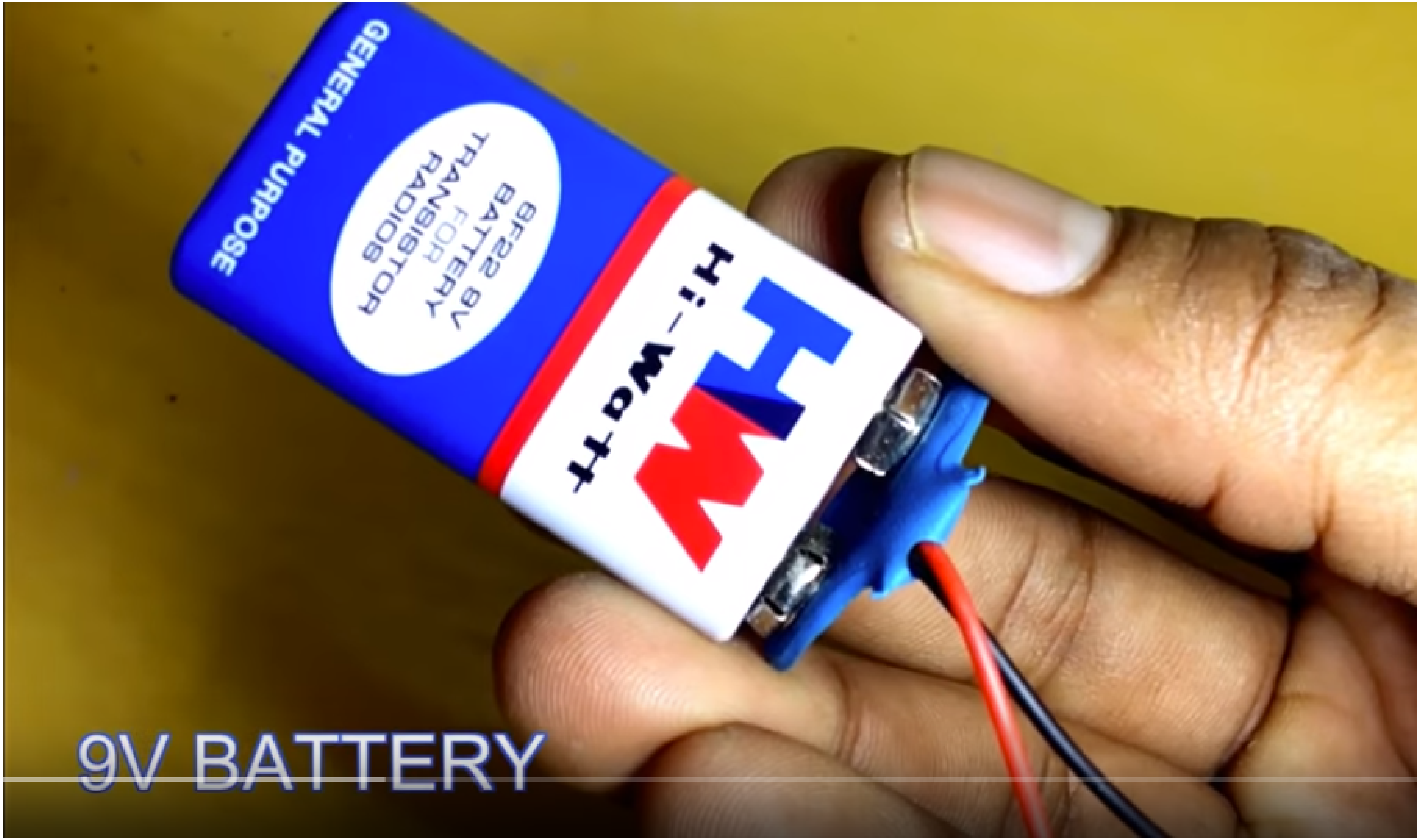
SPLIT/RESET
ALARM
15 01 98
MODE
XL-019
The Unwanted Guy



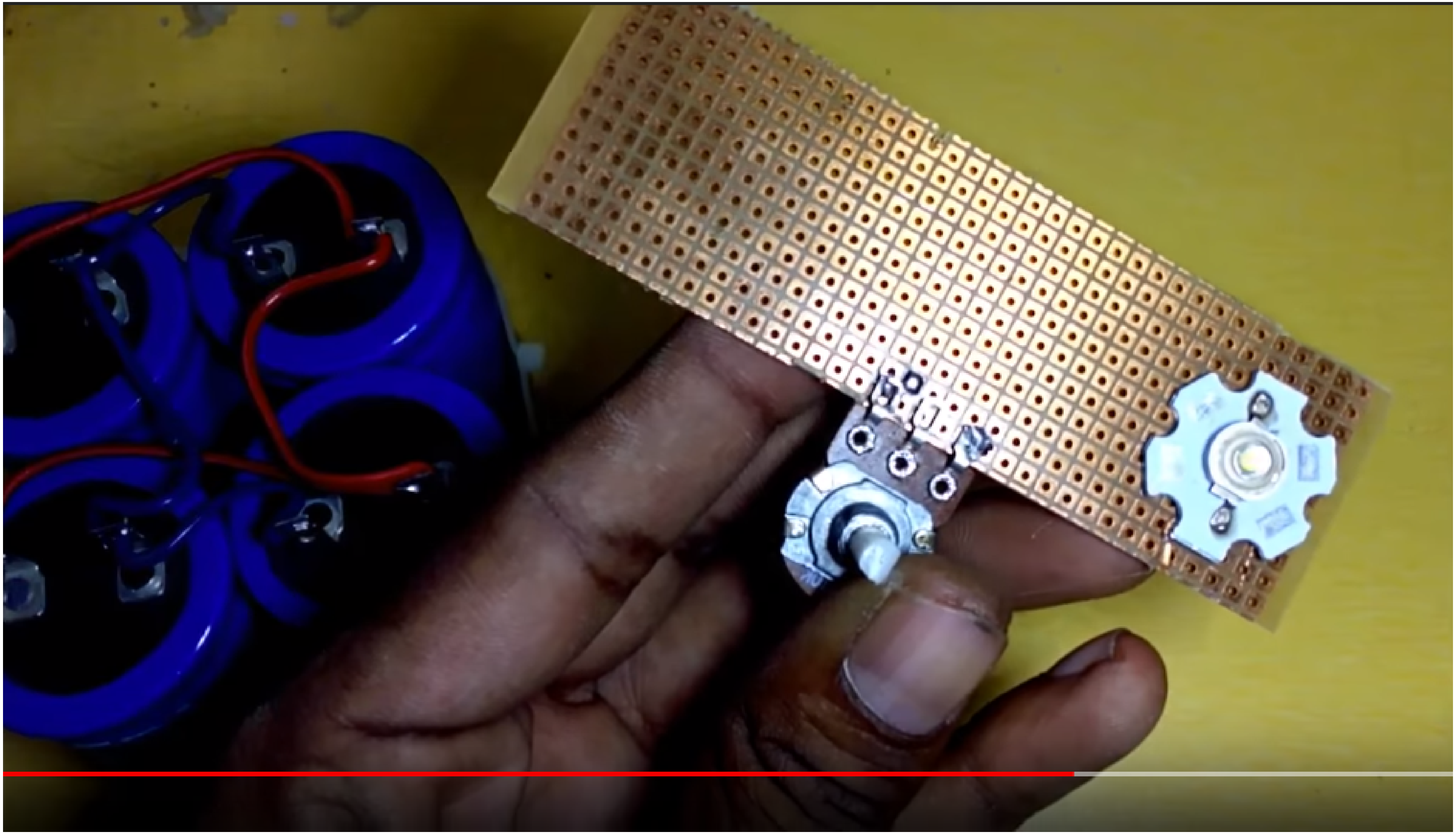

5000µF
50 vdc
105°C
-10 + 10%
(Black Neg.)
5000MFD/50V

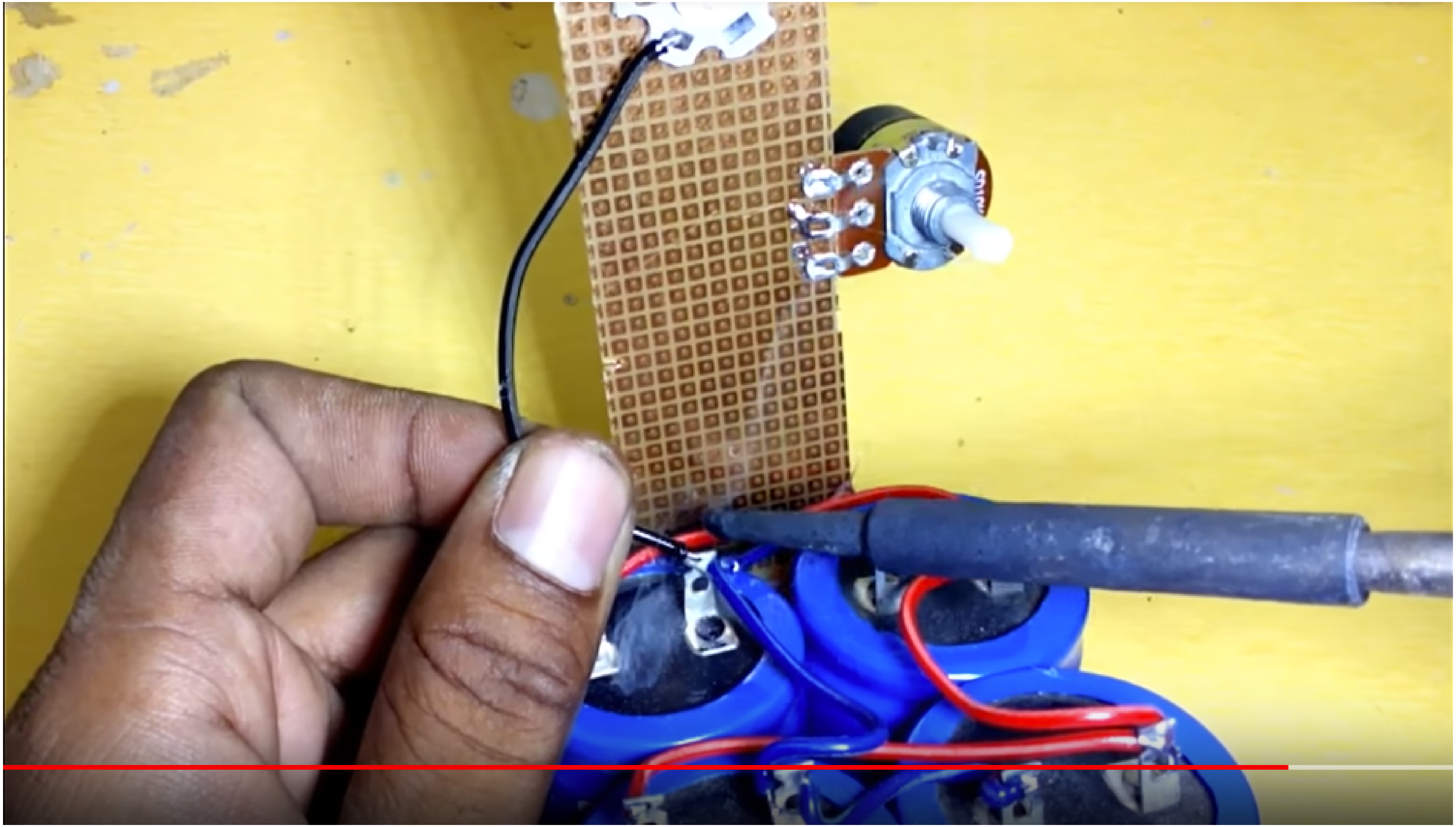

10K V.C

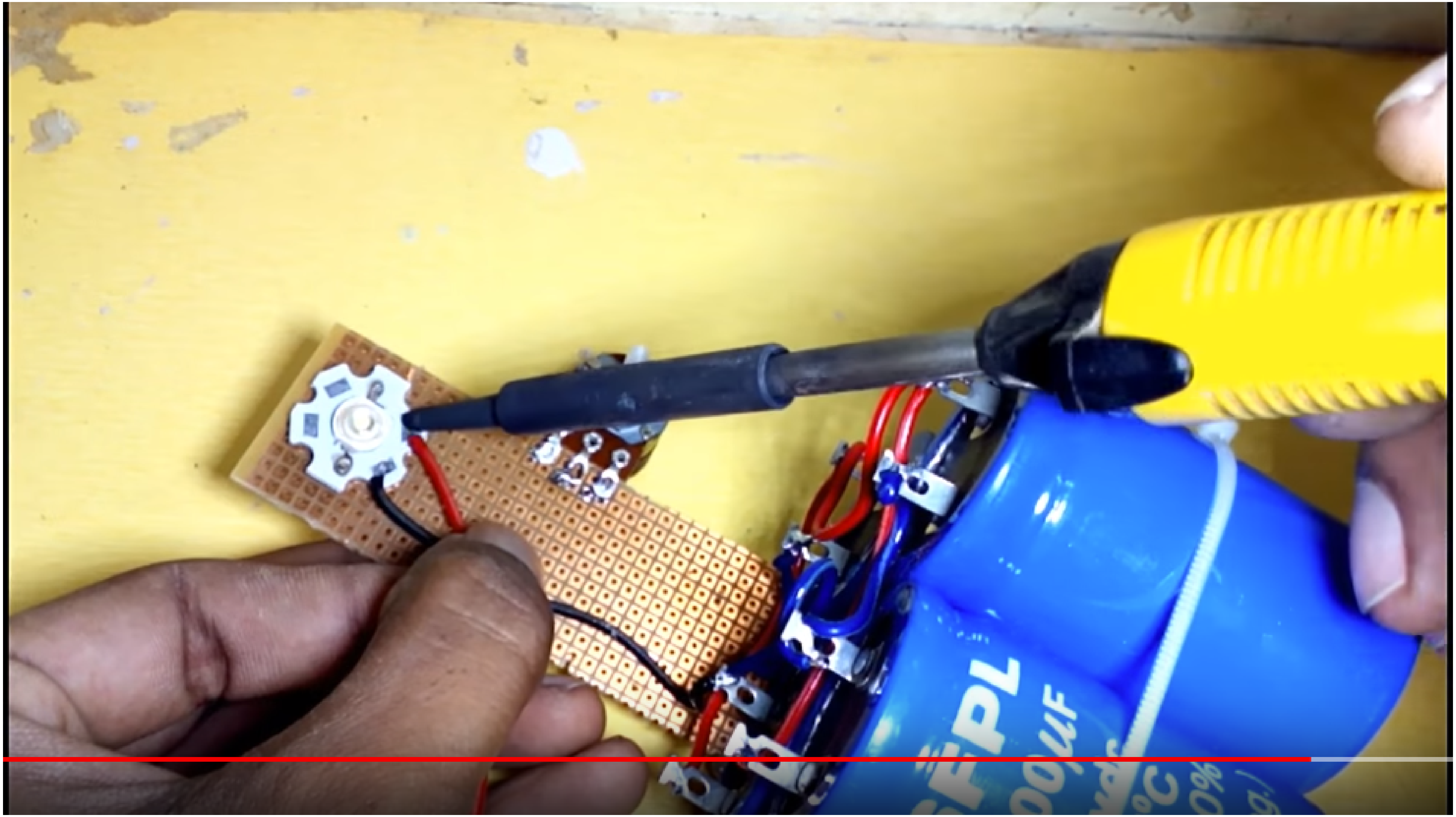

DOT BOARD

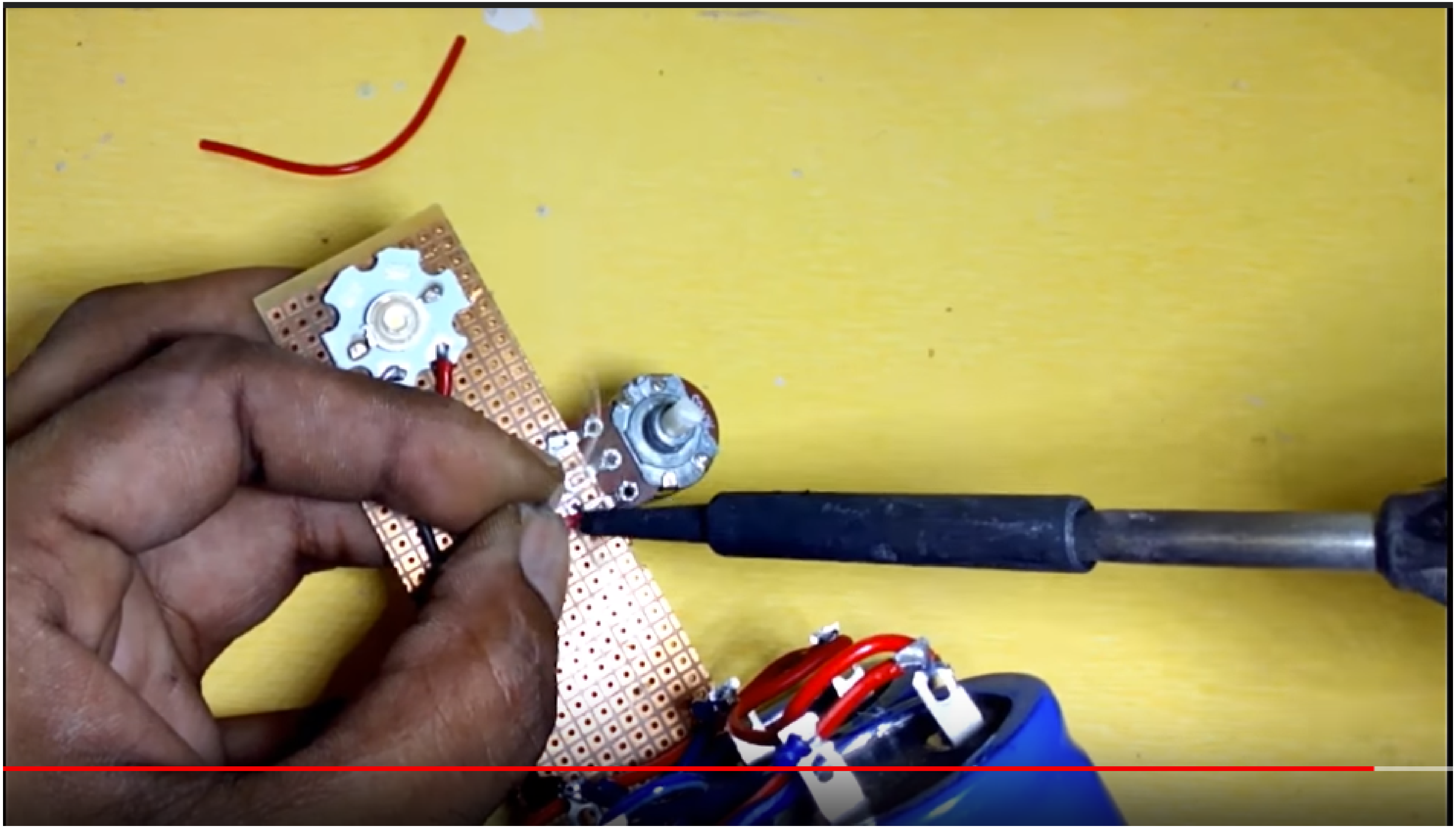

GENERAL PURPOSE
6F22 9V
BATTERY
FOR
TRANSISTOR
RADIOS
Hi-Watt
9V BATTERY

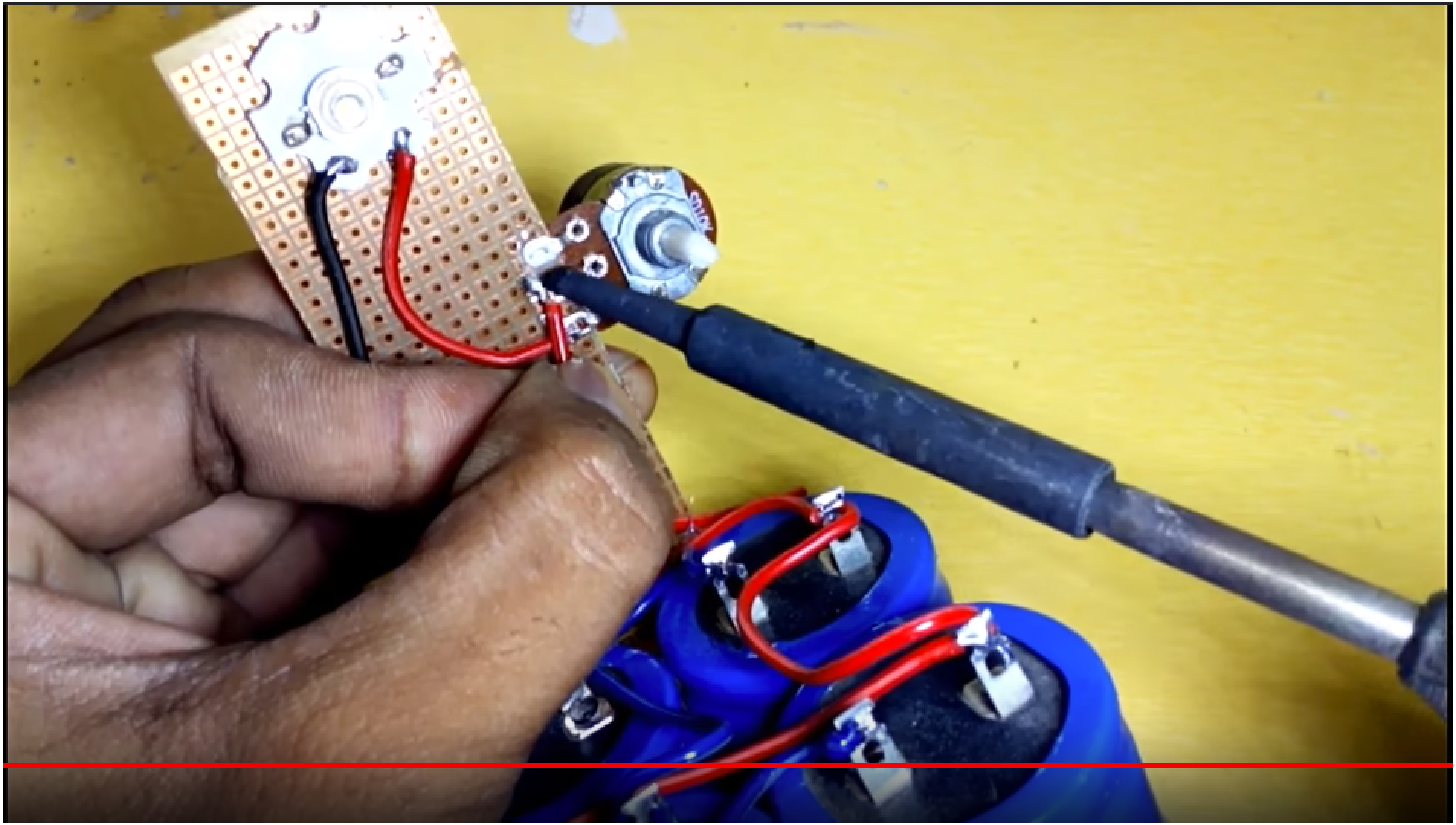

3V LED

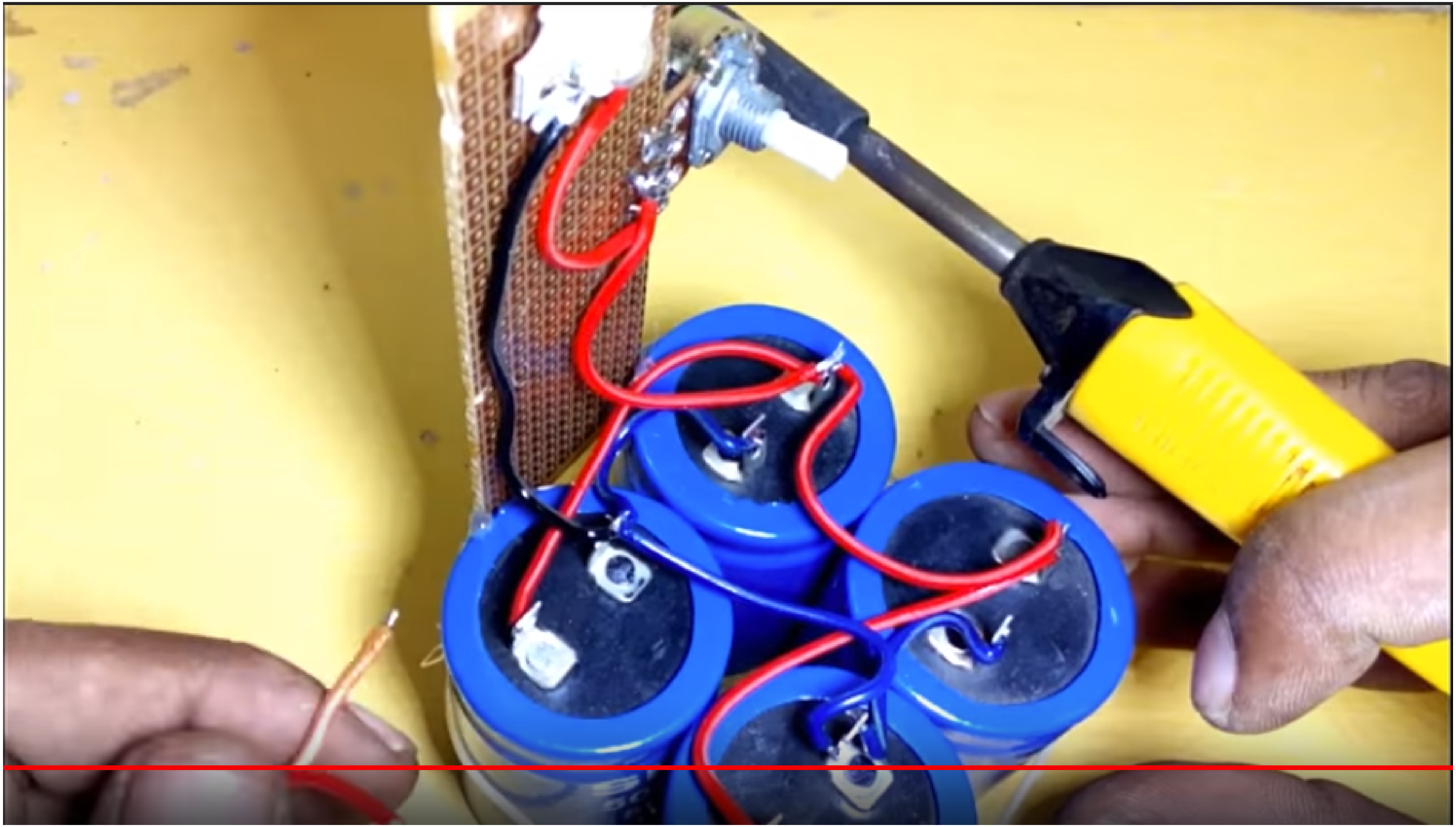


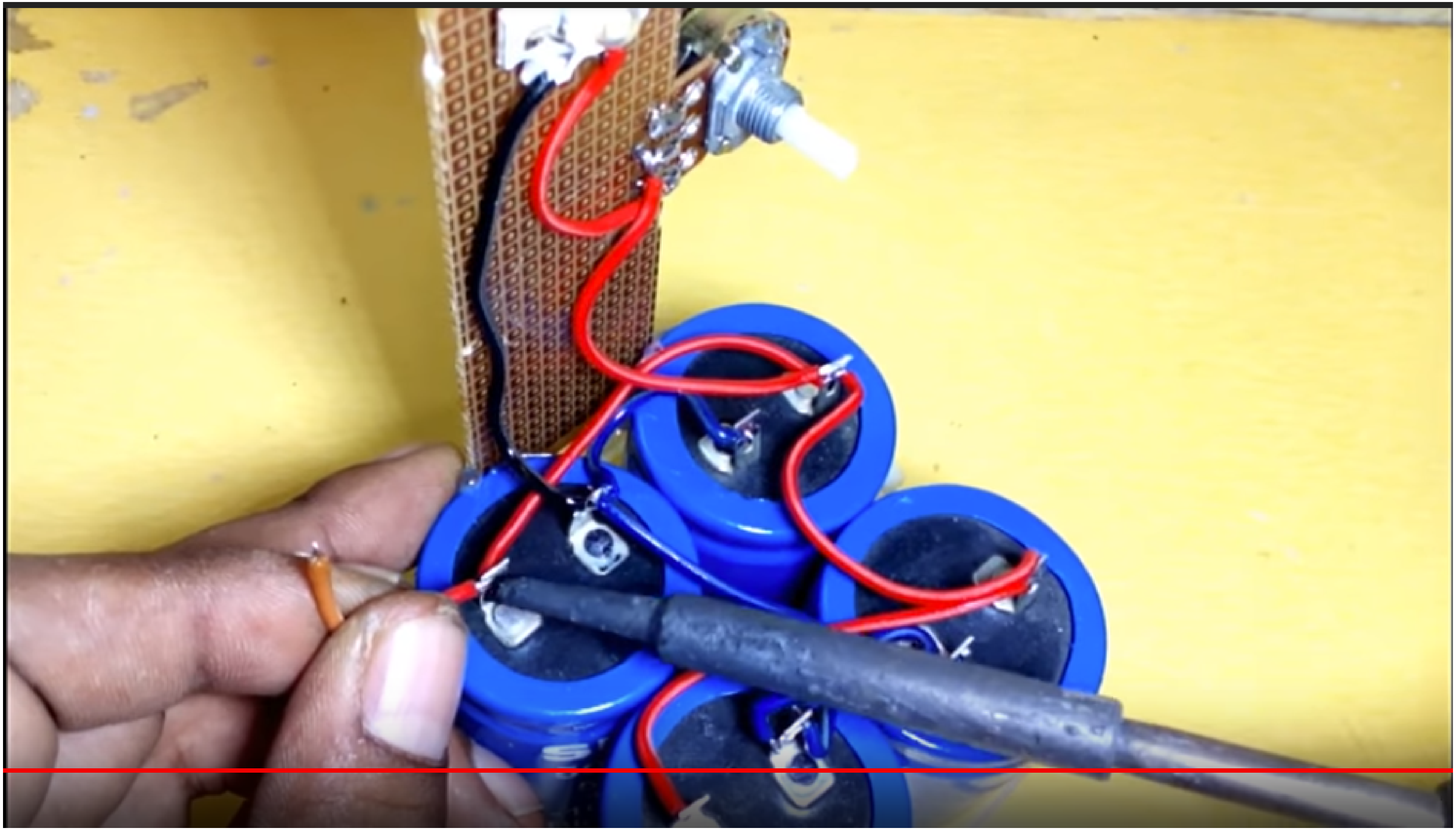


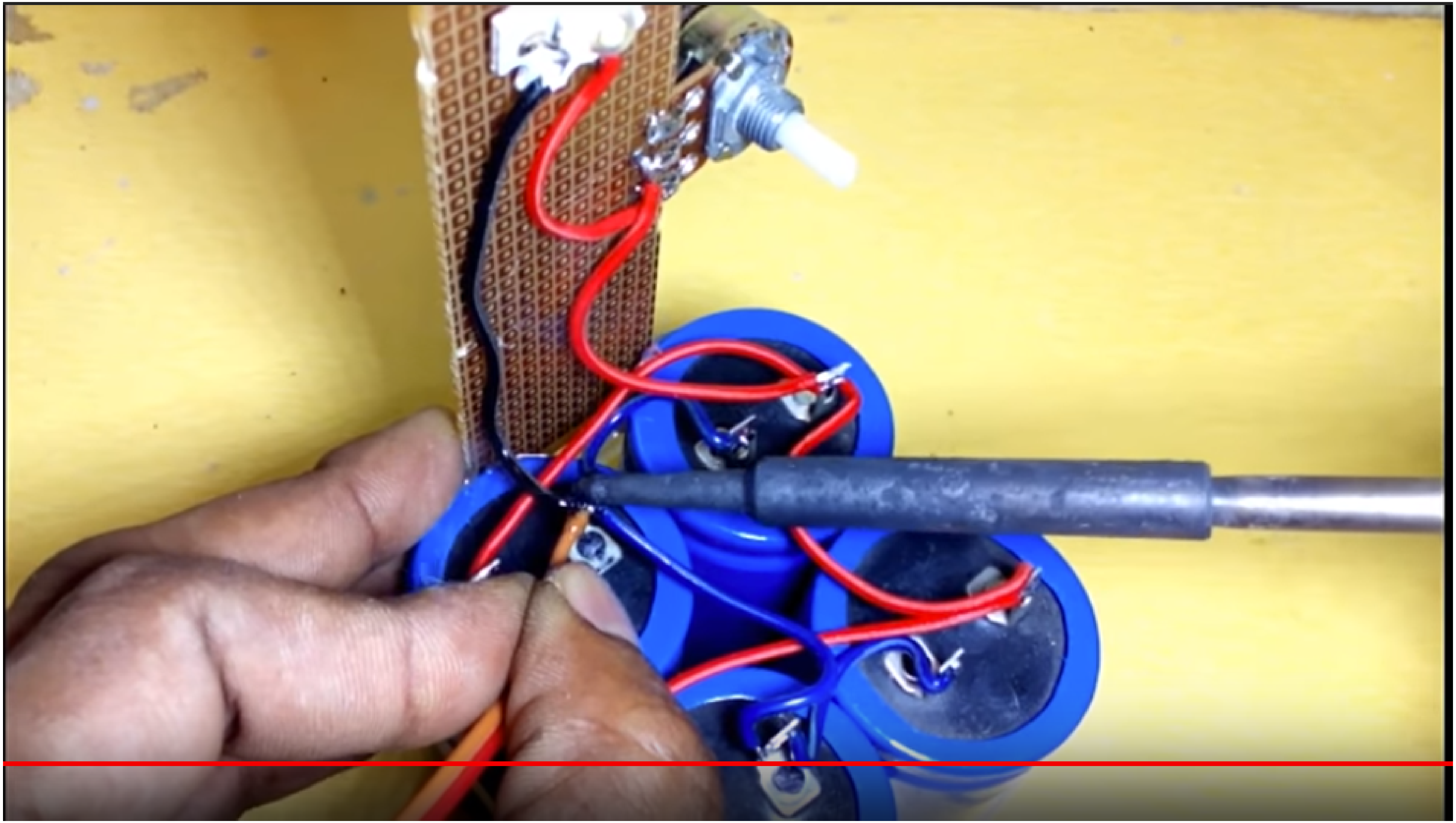


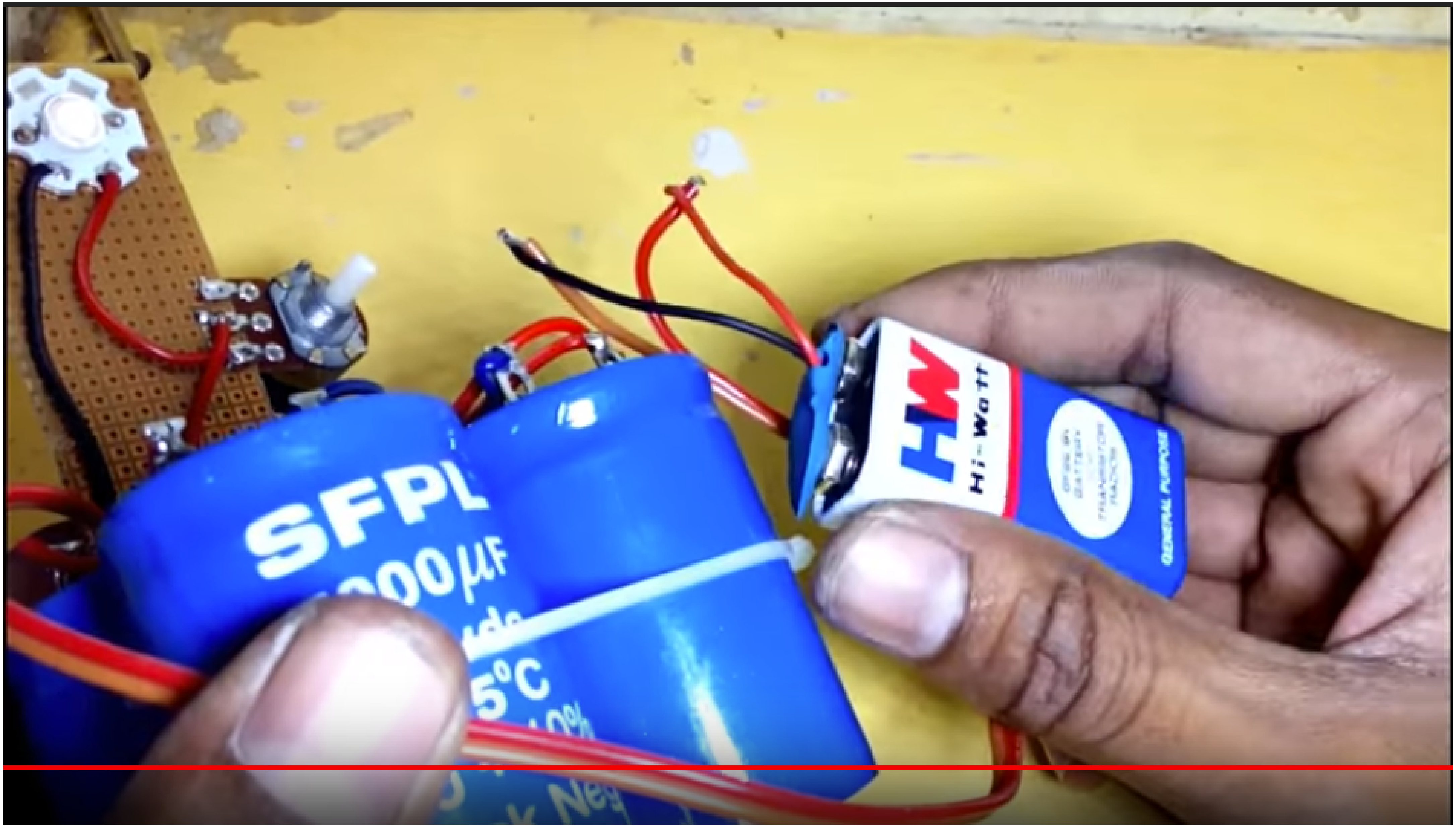








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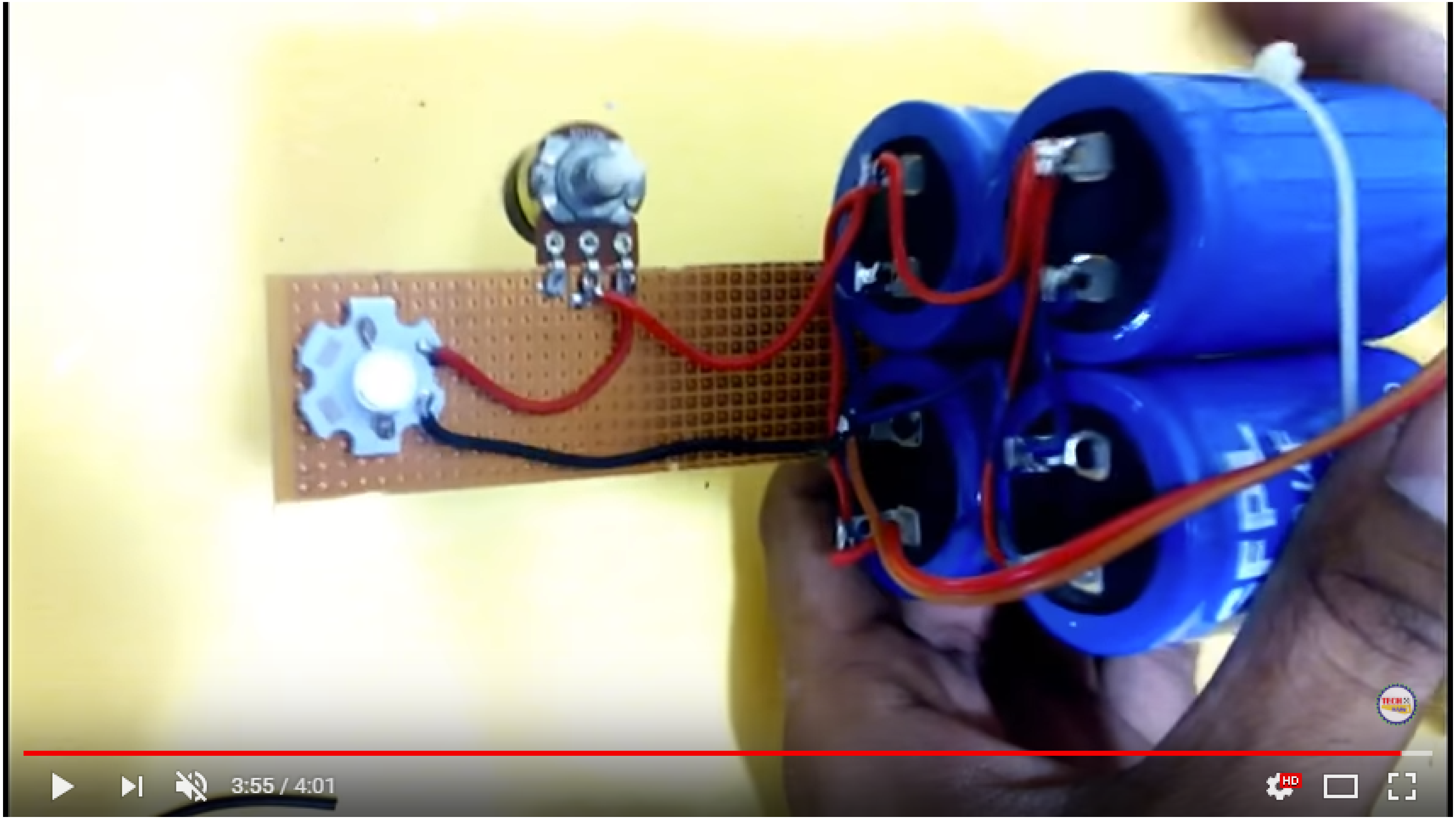
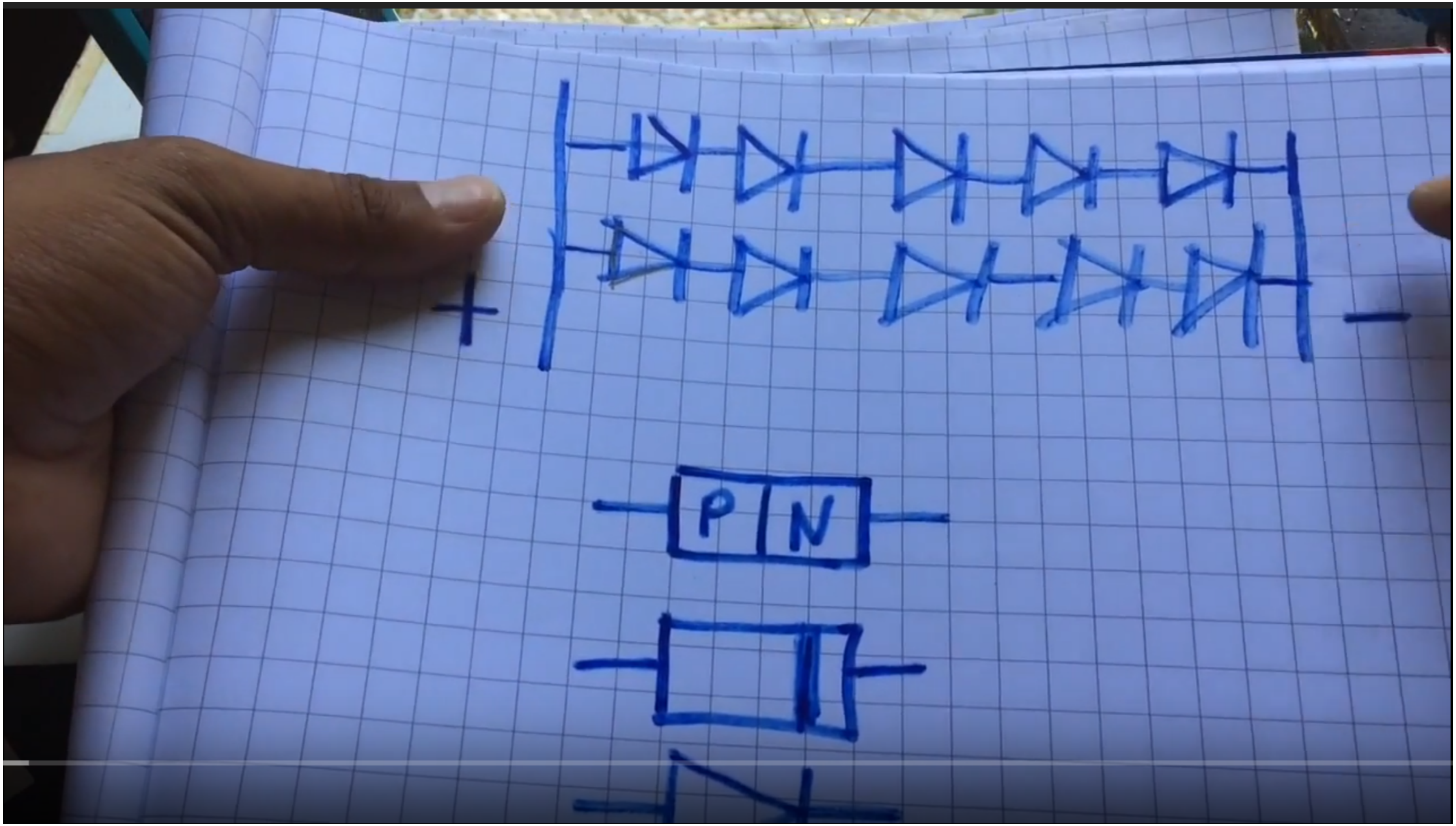
Hi-Watt
GENERAL PURPOSE



Real free energy using capacitor 1000% working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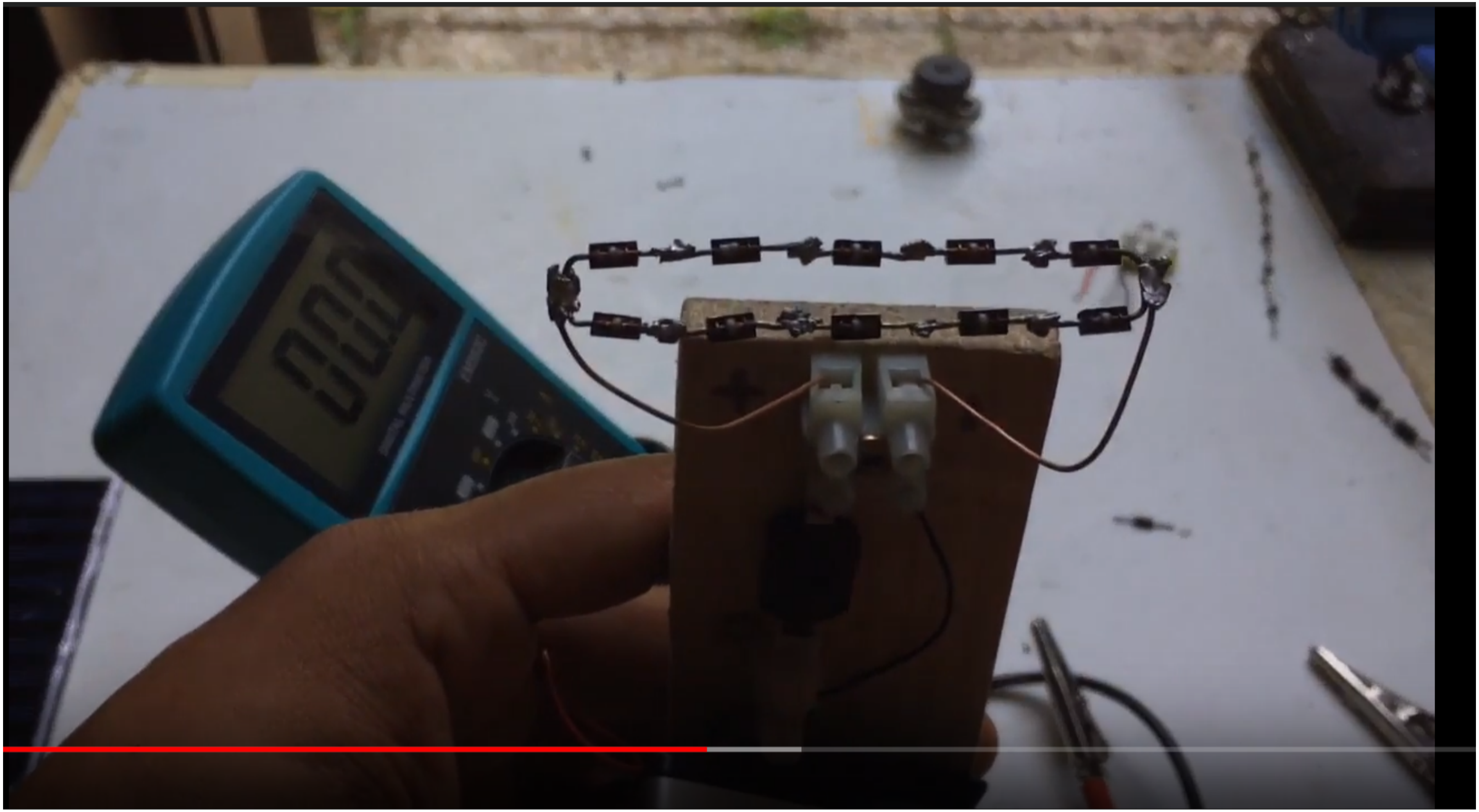

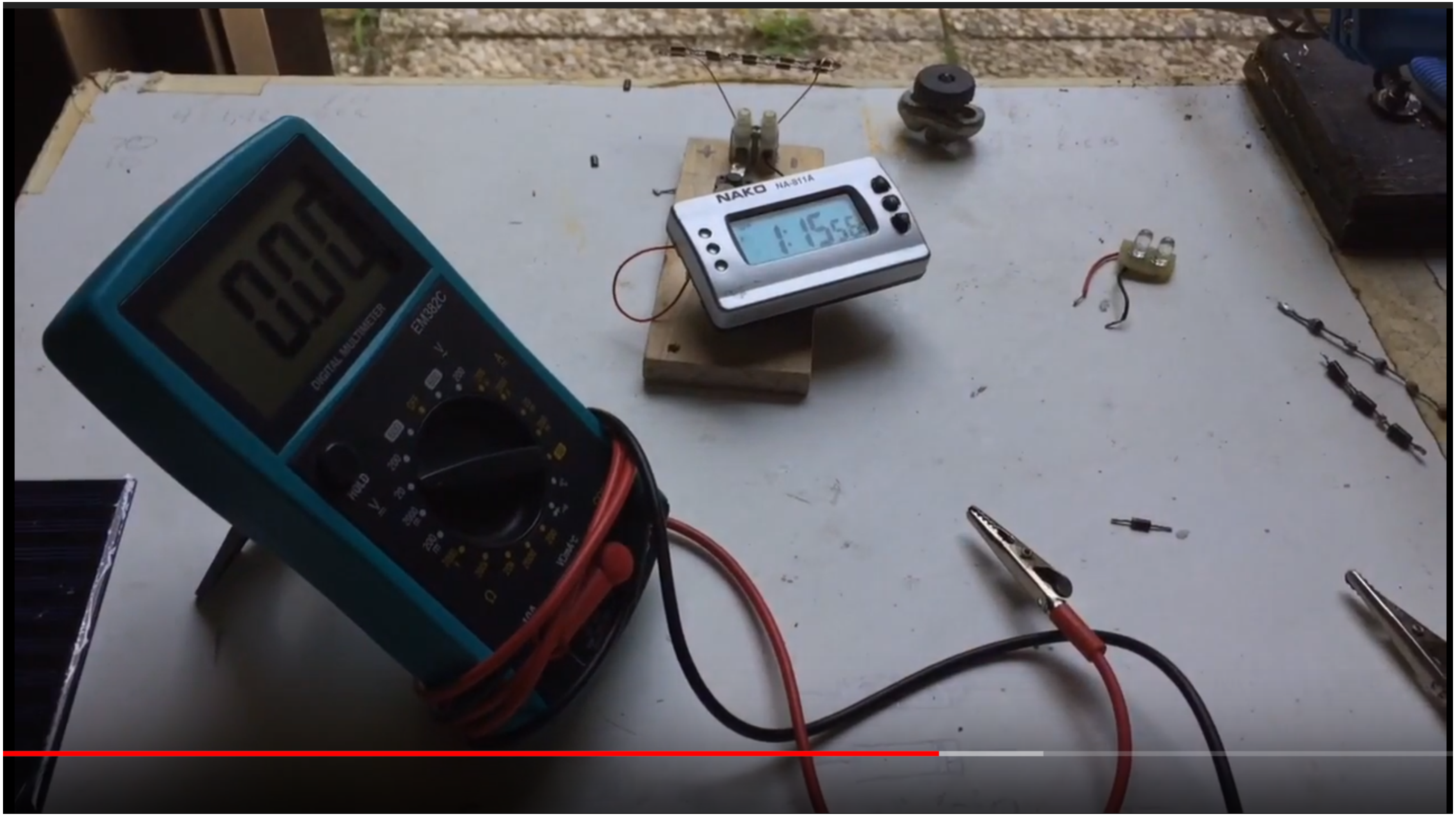
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DIGITAL MULTIMETER
EM382C
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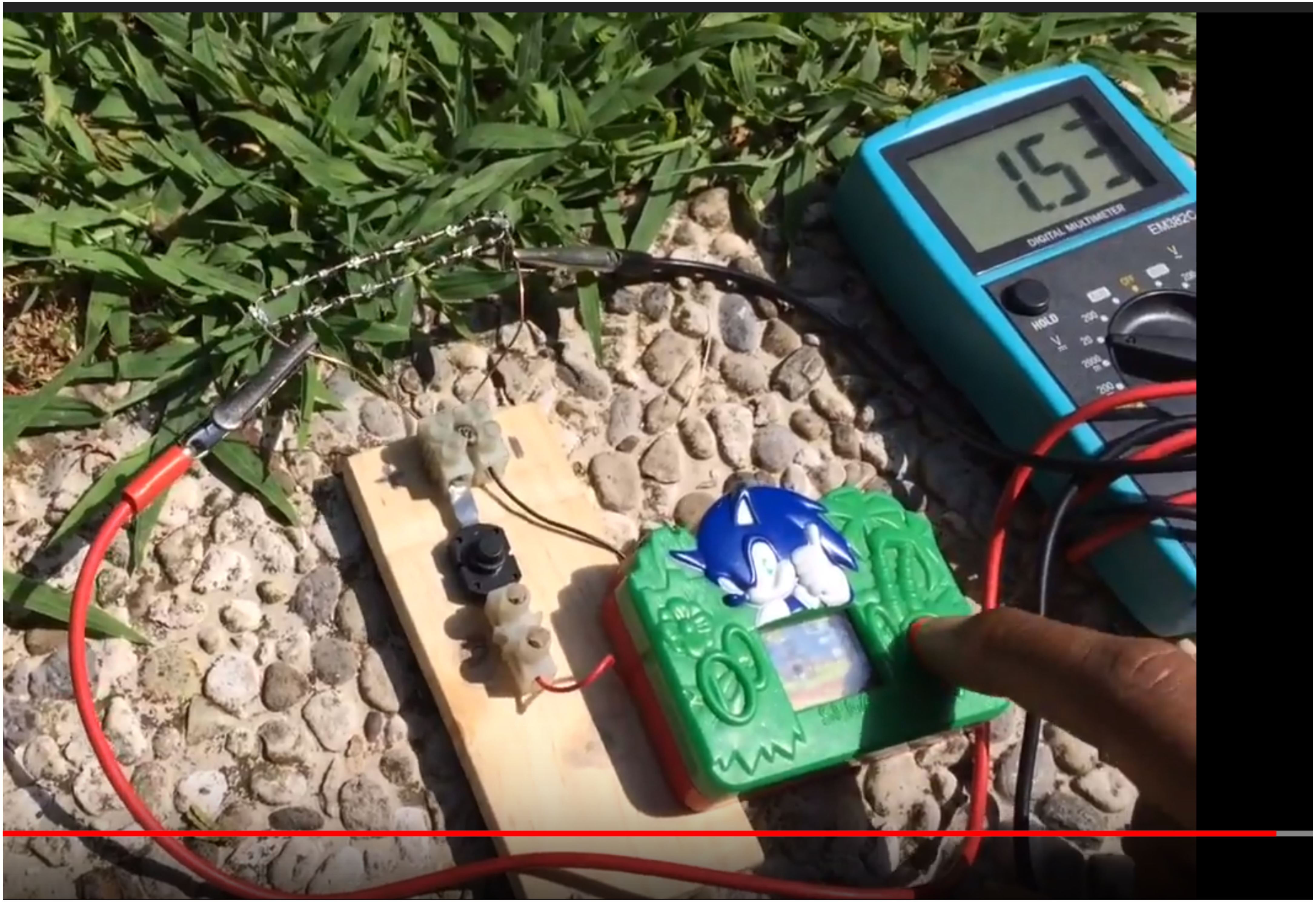
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Celda solar muy fácil de hacer

Up next

AUTO

Panel Solar Casero (


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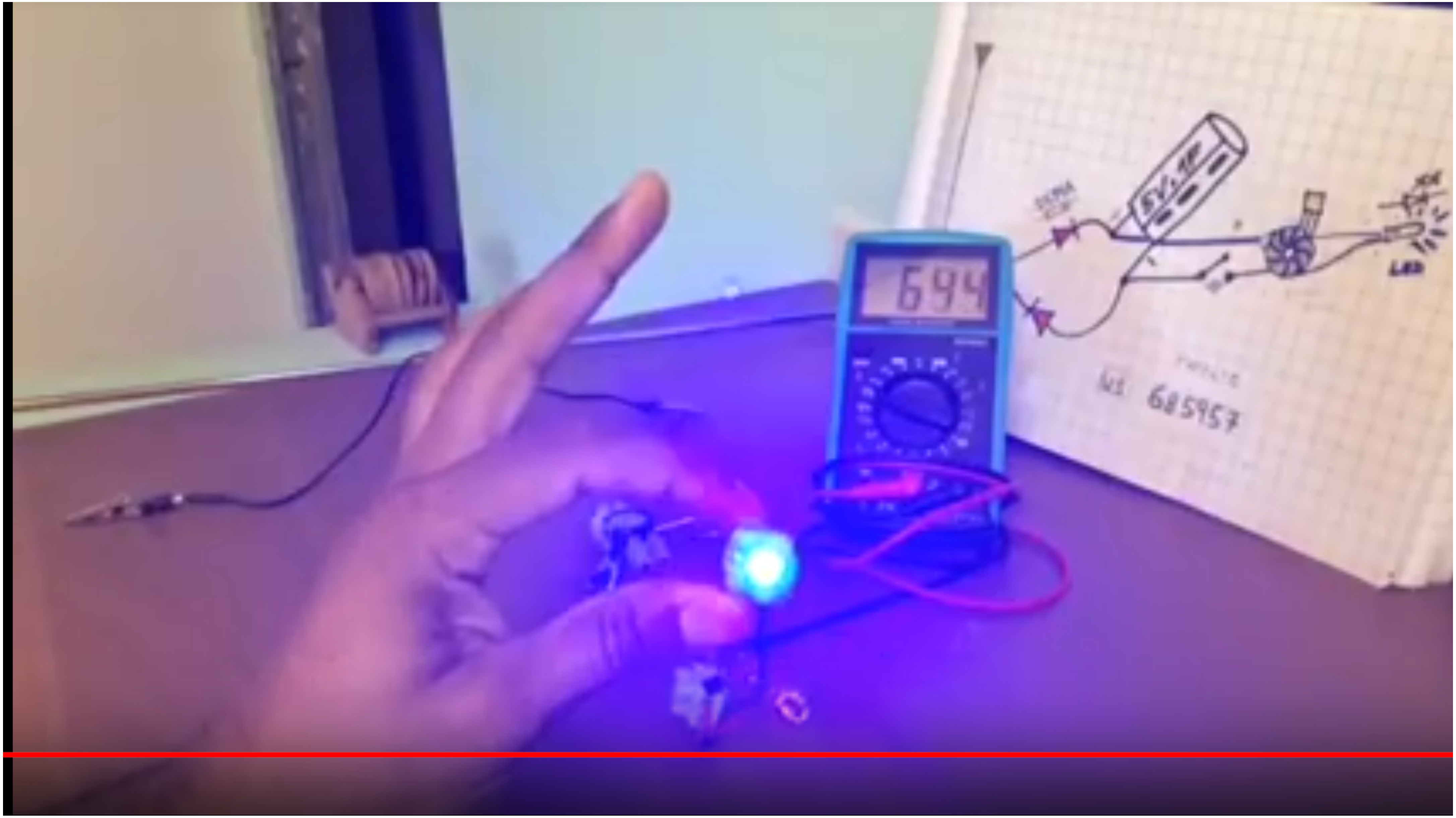
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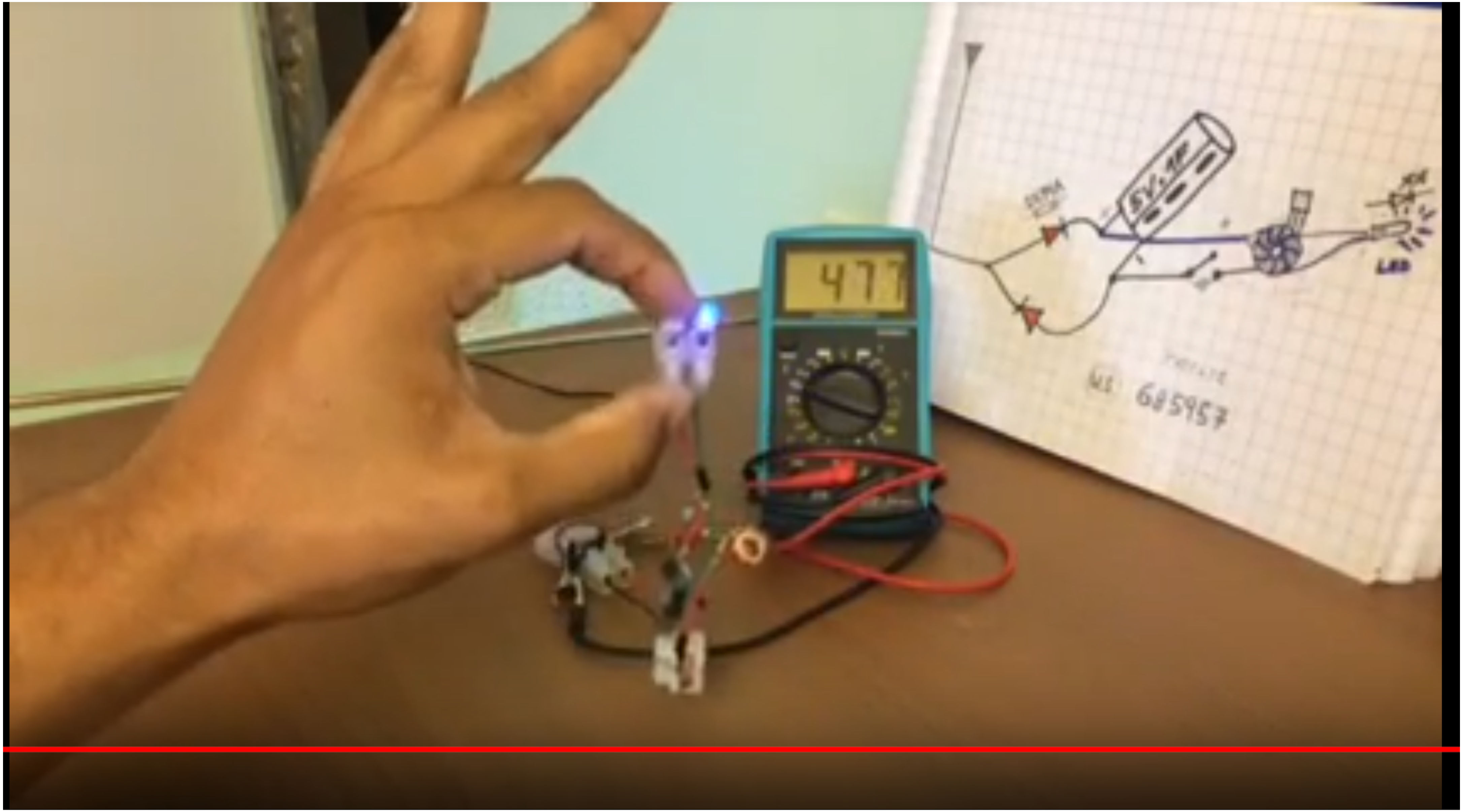
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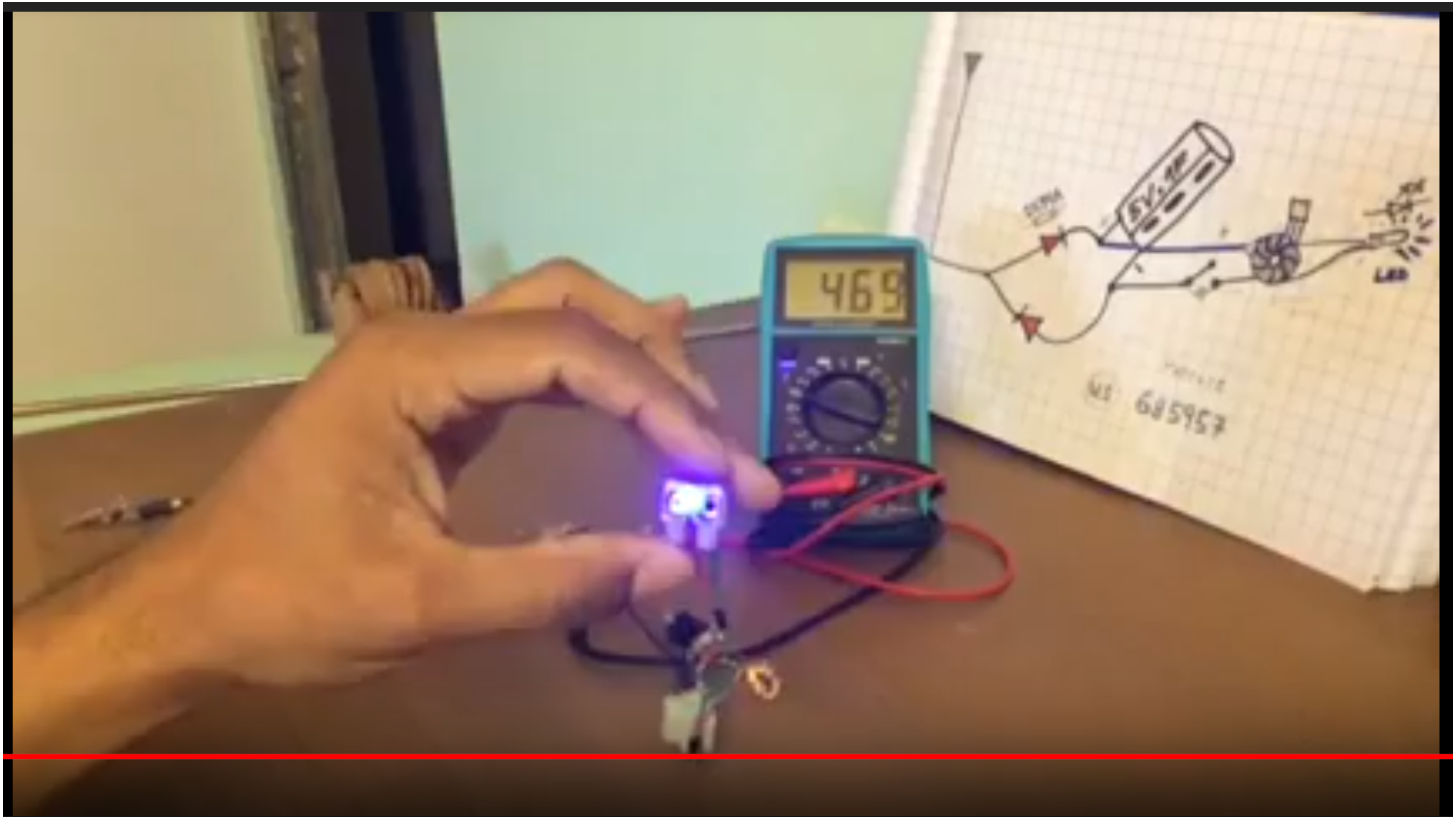
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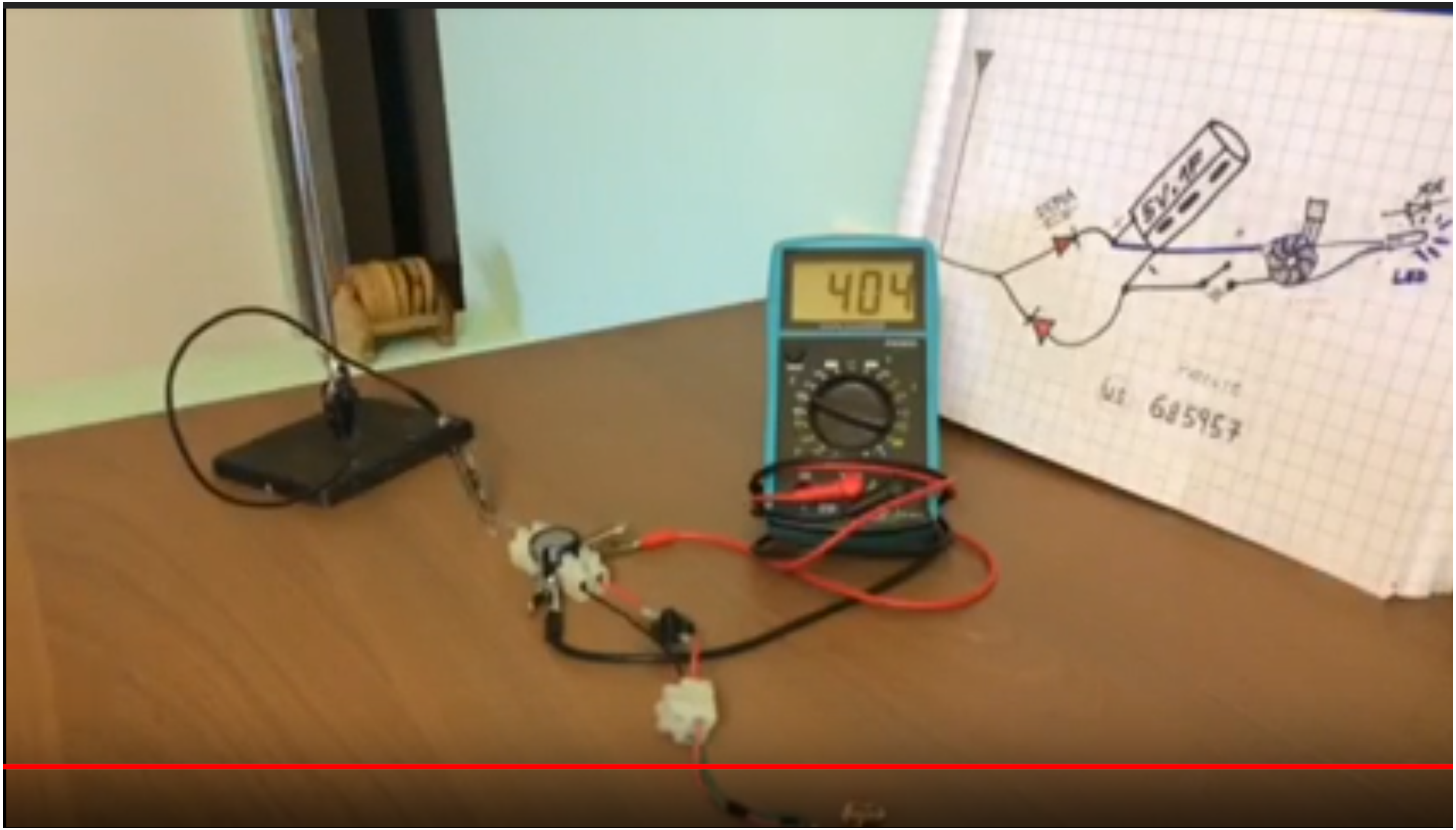
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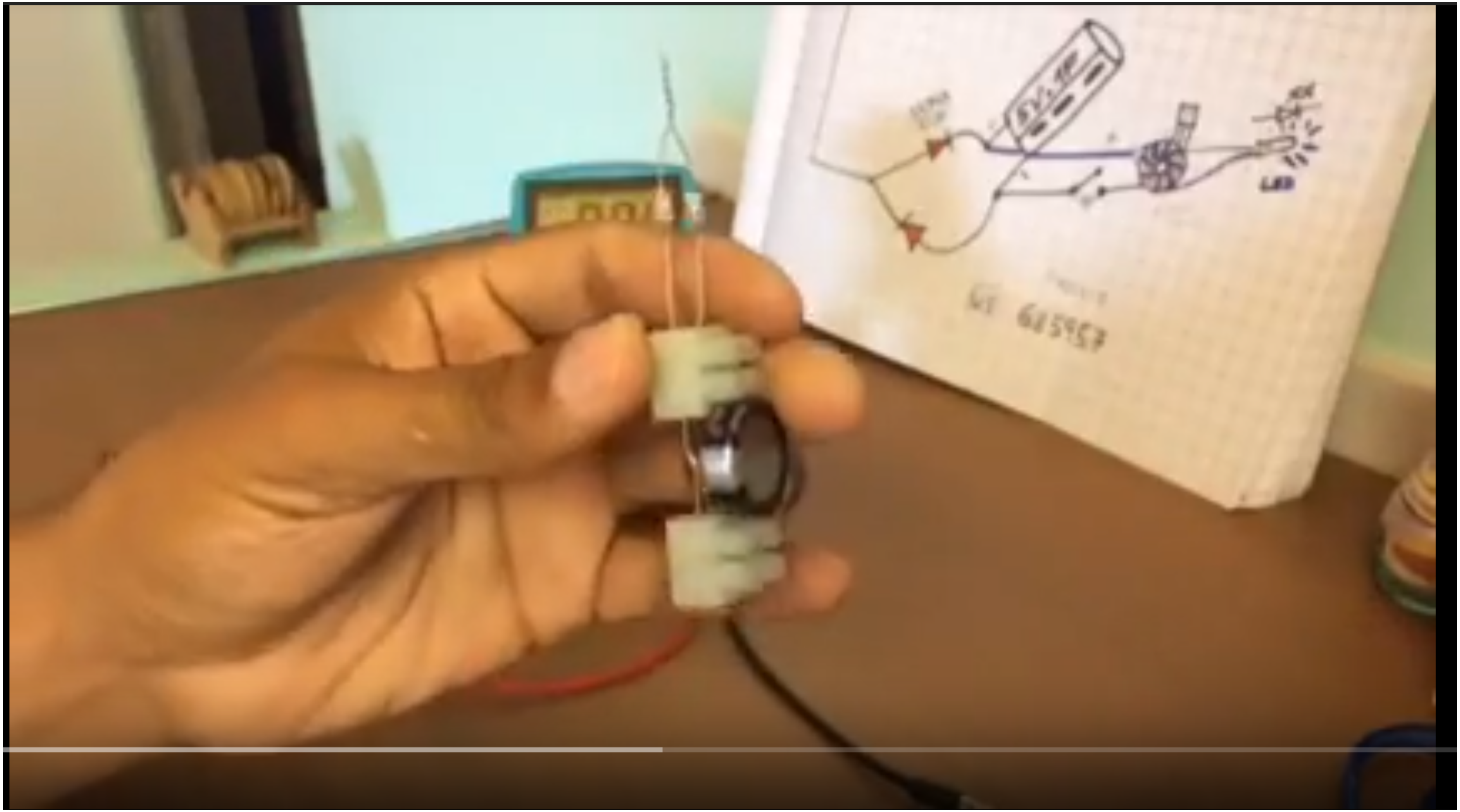
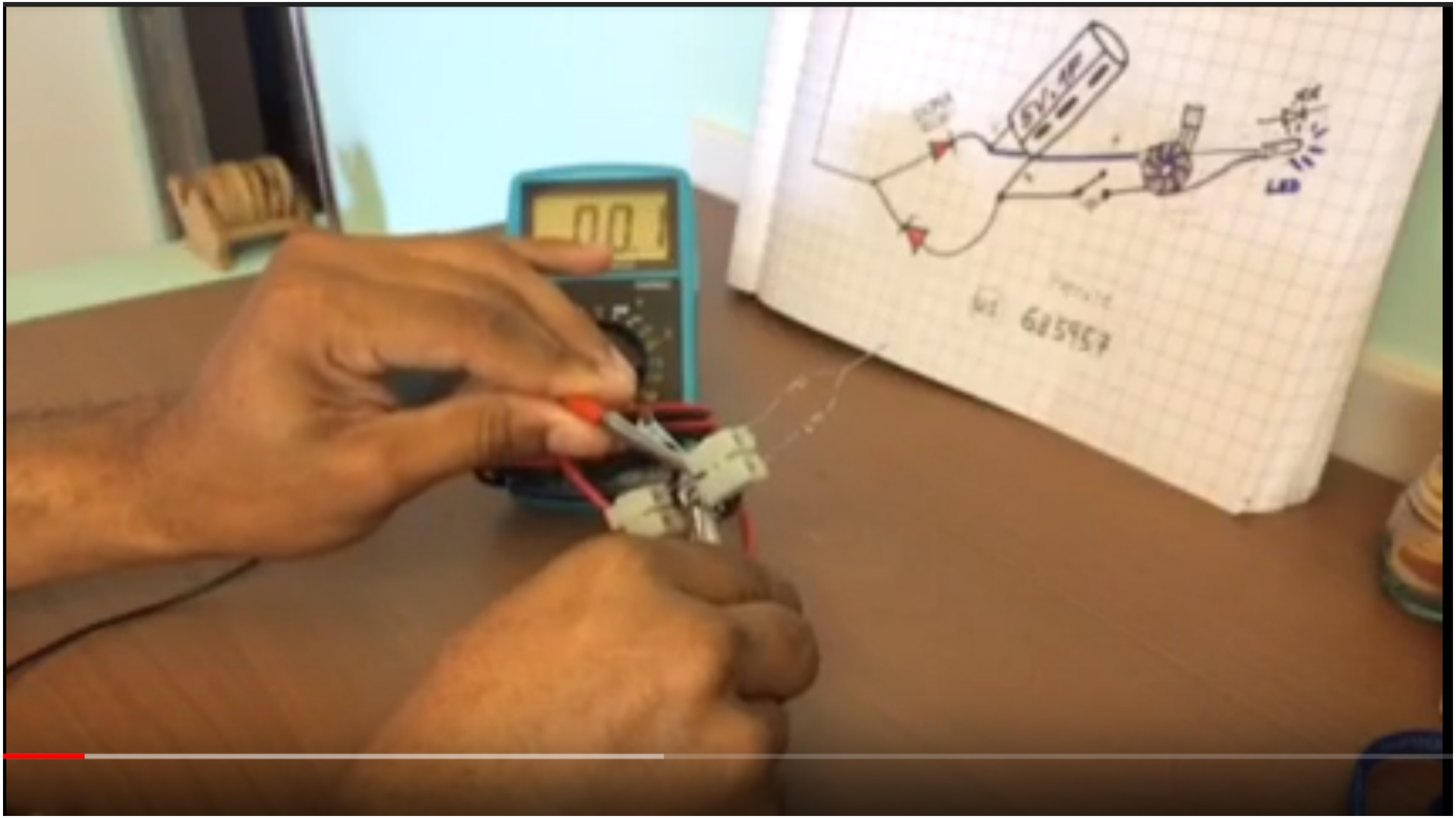
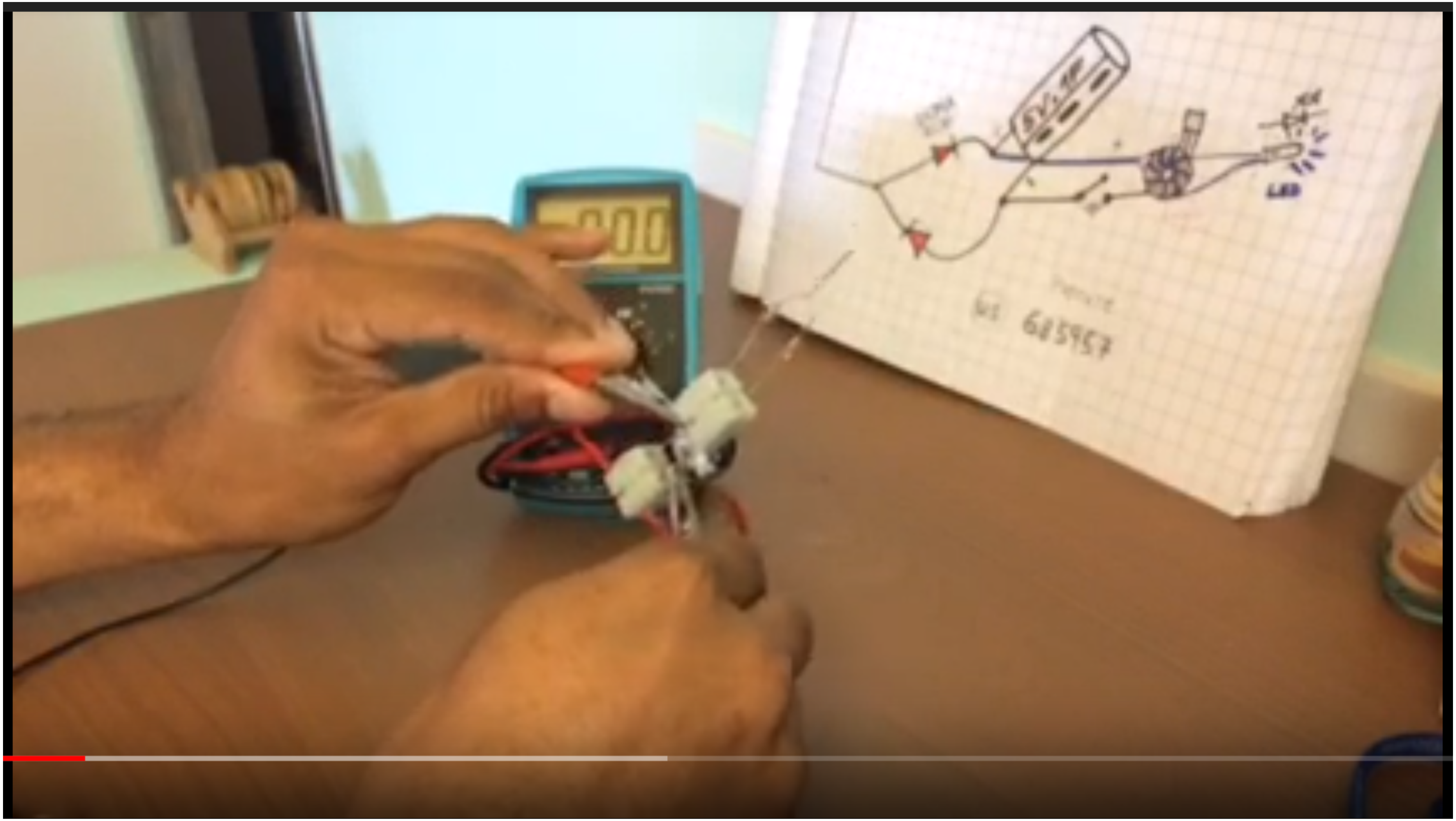

LED




LED
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0 1.6
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